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A

GENERAL SYSTEM

OF

TOXICOLOGY,

OR,

A TREATISE ON POISONS,

DRAWN FROM

THE MINERAL, VEGETABLE, AND ANIMAL KINGDOMS,

CONSIDERED AS TO THEIR RELATIONS

WITH

PHYSIOLOGY, PATHOLOGY, AND MEDICAL JURISPRUDENCE.

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TRANSLATED FROM THE FRENCH.

Unicum signum *certum* dati veneni est *notitia botanica* inventi veneni vegetabilis, et *criterium chemicum* dati veneni mineralis.

PLENCK. *Toxicologia.*

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A

GENERAL SYSTEM

OF

TOXICOLOGY.

CHAPTER III.

Class 3d. *Of Acrid Poisons.*

791. The name of acrid poisons has been given to such as possess a taste more or less caustic; and which, when applied to the surface of the body, produce inflammations, accompanied frequently by *phlyctenæ,* with loss of the epidermis; and which commonly terminate in suppuration. When introduced into the stomach, these poisons give rise to local phenomena, similar to those we have described under the article *corrosives,* notwithstanding the opinion of some physiologists who have pretended to establish distinctions drawn from the lesions presented by the animal texture after death. This truth will be placed beyond all doubt when we come to treat of the general principles relative to poisonous substances of this class.

OF WHITE HELLEBORE.

792. The white hellebore, *(Veratrum Album),* Cl. Polygamia, O. Monœcia, Lin. family of the *Junci,* (of Jussieu), appears to be the real hellebore of the ancients.

Characters. Male flowers. Corollæ of six petals, considered by many botanists as a polygon of six equal divisions, coloured: six stamina. The same arrangement is found in the hermaphrodite flowers, which have beside three distinct germens, bearing short styles, and changing into oblong capsules, with two valves and several membranous sheaths arranged in two rows; the capsule opens into each cell by an interior suture: stem the height of one *metre*,* straight, simple, and cylindrical, terminated by a panicle of greenish white flowers, the corollæ of which are straight, or moderately open: leaves, very large, oval, lanceolated, sulcated by numerous and parallel ribs: root thick, fleshy, fusiform, yellow without, white within, of an acrid, bitter, and disagreeable taste; it excites a burning in the throat.

ACTION OF WHITE HELLEBORE ON THE ANIMAL ECONOMY.

Experiment 1st. At one in the afternoon a small dog was made to swallow two drachms and a half of the dried root, perfectly pulverized. At the end of five minutes the animal began to vomit, and in a quarter of an hour from the ingestion of the poisonous substance, he had already vomited six times some mucous bilious matter of a yellowish colour. At a quarter past two he was moaning, and making excessively deep inspirations; his mouth was filled with foam. At three, he walked about with great difficulty; staggered in every respect like a person intoxicated with wine. The next day at half past twelve, he had no longer any vertigo, and was able to walk about at his ease. The following day at nine o'clock, he ate very heartily, and since that time his health has been perfectly restored.

Experiment 2nd. At one o'clock the œsophagus of a to-

* A French measure of recent adoption equal to 3 feet 11 lines $\frac{3}{10}$. Tr.

lerably strong dog was detached and perforated, and two drachms of the dried root of white hellebore in powder, contained in a cone of paper, were introduced into the stomach, and the œsophagus was tied. At two, violent efforts to vomit; an hour and half after, dejection and moaning: the animal however walked about freely. At eight in the evening, very strong vertigoes: he died two hours after. The mucous membrane of the stomach was of a tolerably bright red throughout its whole extent, without any vestige of ulceration; that which lined the duodenum and jejunum was somewhat red; no sensible alteration in the other organs. Wepfer affirms that he administered to a puppy of three weeks old, a scruple of white hellebore mixed with milk: the animal instantly vomited it, had some alvine evacuations, and a few convulsive movements; an hour afterwards it appeared to be dead. In half an hour it was opened: the heart and diaphragm were contracting; the interior of the stomach was somewhat red. (WEPFER, *Cicutæ Aquaticæ Historia et Noxæ*, p. 219.)

Experiment 3rd. At eight in the morning an incision was made in the internal part of the thigh of a middle sized dog, and the wound sprinkled over with twenty grains of white hellebore powdered: the lips of the wound were brought together by several stitches, and the animal was muzzled, in order to prevent him applying his tongue to the part operated on. Six minutes after, he vomited; he lay down upon the belly, and made some moaning; at three-quarters past eight he had already made more than twenty times violent efforts to vomit, and had thrown up some bilious mucosities: he suffered such a degree of vertigo as rendered him incapable of advancing two steps without falling: he still retained the use of his senses, and uttered no moan: his eyelids were frequently agitated by a kind of convulsive movement. At nine o'clock he could no longer stand: the pulsations of the heart, which were strong, hurried, and irregular, did not appear to cor-

respond with the state of stupefaction in which the animal was plunged; he often performed the motions of deglutition. At half past nine, the eyelids and the pulsations of the heart were in the same condition; the inspirations were very deep; there was no convulsive movement, and the animal was so far sunk, that he might have been taken for dead. At ten o'clock the pupils began to be dilated. At one no change had taken place; he was shaken; he made a slight movement, and fell again instantly: the pupils were extremely dilated, and the snapping of the eyelids went on increasing. He expired at three in the afternoon. An hour after, he was opened: there was only a slight oscillation of the heart; the blood contained in both ventricles was fluid: the lungs, which were distended with blood, and somewhat less crepitating than in their natural state, were spotted over with some black patches: the interior of the rectum presented several black spots: the mucous membrane of the stomach was a little inflamed as well as the wound. Similar results were obtained with two other animals, except that in one case, the digestive canal had sustained no injury.

Experiment 4th. The same experiment was repeated upon a very robust dog, by sprinkling the wound with ten grains of white hellebore root finely powdered: twenty minutes after, he began to make efforts to vomit, and vomited ten times in the course of the succeeding twenty minutes. Three hours after, he was suffering greatly, and had very severe vertigoes, which were quieted during the night. The next morning he walked tolerably well, and made no more moaning. The following day he took a little food, and made his escape.

Experiment 5th. At six in the morning, a robust dog was made to take the fluid obtained by treating an ounce of white hellebore by boiling water. This fluid had been filtered and concentrated. The œsophagus was then tied: in five minutes the animal made efforts to vomit. At seven o'clock he began to experience a weakness in his posterior extremities: he

vacillated in walking. These symptoms went on increasing, and the animal died at eleven o'clock. He was opened the next day. The stomach contained a tolerably large quantity of thick mucus: it was very little inflamed. The mucous membrane of the rectum was of a red colour tolerably bright: the lungs exhibited livid spots; they were dense, and but little crepitating.

Experiment 6th. At eight in the evening, three drachms of the powder of white hellebore root, the soluble parts of which had been completely separated by boiling several times over in water, were applied to the cellular texture of the thigh of a small weak dog. Four days after, the animal had experienced no other symptoms than such as are inseparable from the operation. He died on the sixth day, and it was impossible on dissection to discover any alteration.

Experiment 7th. The same experiment was repeated upon another small dog, with three drachms of the same powder, which had not been boiled a sufficient time in water to deprive it of all its soluble parts: the animal died at the end of thirty-six hours: he did not begin to feel the symptoms of poisoning until ten hours after the application of the poisonous substance.

Observations.

1st. *Etmuller* says, in the Preface to his work on Surgery, that this root, when applied to the abdomen, produces a violent vomiting.

2nd. *Schreder* has observed the same phenomenon to take place in a case where this root was used as a suppository.

3rd. *Helmont* reports that a royal prince died in the course of three hours after taking a scruple of this poison, which induced convulsions.

4th. Given in the same dose, the root of hellebore has produced spasms, suffocation, loss of voice, and a coldness over the whole body. (Vicat, *Histoire des Plantes Vénéneuses de la Suisse*, p. 165. *Yverdon*, 1776.)

5th. A tailor, his wife, children and workmen, took some soup in which the root of white hellebore had been put instead of pepper. Shortly after, these persons were seized with a general coldness, and their bodies became covered with an icy sweat; their debility was extreme; they were almost in a state of insensibility; and their pulse could scarcely be perceived. At the expiration of two hours, the eldest child, who was not four years of age, began to vomit copiously, but with considerable straining; the rest were shortly after in the same condition. Vicat, who was called in at this juncture, ordered them to take a considerable quantity of warm water with oil, and shortly after gave them mallows tea sweetened with honey, by which means they were relieved, and completely restored. (*Idem*, p. 166.)

6th. *Theophrastus* asserts, that the vines, amongst which the white hellebore grows, yield a wine which provokes urine.

7th. Several authors affirm, that the root of white hellebore dried, powdered, and snuffed up the nose with the intention of producing sneezing, has caused abortions, floodings which it has been impossible to restrain, hæmorrhages from the nose, suffocations, and sudden death.

OF BLACK HELLEBORE.

793. Black hellebore (*Helleborus niger*) belongs to the Polyandria Polygynia of *Lin.* and to the family of the Ranunculaceæ of Jussieu.

Characters. Calyx permanent, composed of five or six broad leaflets, rounded, open, of a rose colour at first, becoming white as they expand, and resembling petals; five or more nectaria, called *petals* by some botanists, shorter than the calyx, in the shape of a funnel, or cone, with an irregular border, oblique, and as it were lipped: style sharp-pointed, curved a little outwards, the germens transforming themselves after their fecundation into as many compressed, oval, oblong

capsules, presenting at their extremities two keels, one short, and more rounded, the other more elongated, and terminating in a point: each capsule is a kind of follicule, opening only on one side: seeds round, attached to the opposite suture, which takes place of the placenta: flowers large, two inches in diameter, single, or placed two and two upon cylindrical stalks, simple or forked, appearing with the leaves: leaves large, radical, borne upon a petiole, equal at least to the stalk, divided at the top into seven or eight lobes, disposed in oblong pedals, serrated, pointed, of a brownish green, and leather-like; roots composed of one short stump, from which proceed several blackish fibres, frequently covered with a brownish down.

ACTION OF THE ROOT OF BLACK HELLEBORE ON THE ANIMAL ECONOMY.

Experiment 1st. A dog of middle size was made to swallow, fasting, two drachms forty-eight grains of this root. At the expiration of a quarter of an hour he passed a greenish stool: half an hour afterwards he vomited without any effort; these vomitings were repeated four times within the hour. The next day he fed with good appetite, and was perfectly recovered.

Experiment 2nd. At one o'clock two drachms and a half of black hellebore root, in powder, were introduced into the stomach of a very powerful dog, whose œsophagus had been previously detached and perforated; a ligature was then passed over it to prevent the expulsion of the poison. Two hours afterwards the animal made violent efforts to vomit. The next day at noon he was dejected, suffered greatly, and continued to make efforts to vomit; he walked about freely, and preserved the use of his senses. At eight in the evening he experienced vertigoes, staggered on walking, and had now and then some convulsive motions. He died during the night.

Dissection. The stomach was distended by a tolerable quantity of pultaceous matter, in which was suspended a part of the powder ingested; the mucous membrane presented a few points of a deep red colour; in the rest of its extent the colour did not appear altered; in some places it was ulcerated: these ulcers, which were in a longitudinal direction, and short, were principally found upon the folds which it forms on the interior surface of the stomach. The muscular coat was somewhat red; the serous coat, which was of a rose colour throughout, was covered with vessels strongly injected of a blackish brown. The interior of the duodenum, colon, and rectum, was extremely red; the other portions of the intestinal canal did not appear at all altered.*

Experiment 3rd. At two in the afternoon two drachms of black hellebore root, powdered, were sprinkled over a wound made in the interior of the thigh of a powerful dog. The lips were then united by a few stitches. At the end of six minutes the animal vomited some whitish fluid matter, and did not cease to make violent efforts to vomit during the first hour that elapsed; these efforts were sometimes ineffectual, at other times they were followed by the expulsion of a little yellowish bile. At forty-five minutes after two he was suffering such vertigoes that he was not able to make two steps without falling; his hind legs being excessively debilitated, he could not keep himself standing for a moment; he uttered plaintive moans; his pupils were not more dilated than natural. He fell afterwards into a state of general insensibility, and died at half past four. The mucous membrane of the stomach, and that of the rectum, were somewhat red; the lungs presented several places of a rose colour, and others which were livid, blackish, and dis-

* The inflammation of the *rectum* is a constant occurrence where the animals who have taken the black hellebore root have survived its administration for a few hours. *Vicat* has therefore been led into an error by asserting that this poison inflamed all the intestines *except only the rectum.* (*Histoire des Plantes Vénéneuses de la Suisse*, p. 69.)

tended with serosity: they were sufficiently crepitating; the wound was very little inflamed.

Experiment 4th. The same experiment was repeated upon a small young dog, with six grains of the same powder. There were no visible symptoms at the expiration of eight hours. The next day, twenty hours from the operation, the animal was lying down upon his side, and in a state of great dejection; he was quite insensible to external impressions: he might be moved like an inert mass of matter, and could not by any means keep himself on his legs. He died three hours after. No sensible lesion was perceived in the digestive canal, or in the lungs.

Experiment 5th. At seven in the morning, the fluid obtained by treating one ounce of black hellebore with boiling water, was introduced into the stomach of a big dog: this fluid had been filtered and concentrated; the œsophagus was afterwards tied. Ten minutes afterwards the animal made some efforts to vomit; he had also one liquid stool. At three quarters after eight, he experienced some slight vertigoes. At noon, the efforts to vomit were renewed frequently: the animal supported himself with the greatest difficulty; he was nearly insensible. At three o'clock he expired. The mucous membrane of the stomach was slightly inflamed; the interior of the rectum appeared of a cherry-red colour; very slight alteration appeared in the other parts of the digestive canal, the lungs shewed here and there some livid patches; they were dense, and but little crepitating.

Experiment 6th. At five in the morning, the cellular texture of the thigh of a small dog, was sprinkled over with two drachms of the powder of black hellebore root, the strength of which had already been exhausted by boiling water: the edges of the wound were then brought together by a few stitches. Three days after, the animal had shewed no other phenomena than that dejection which constantly accompanies this operation. He died on the fifth day: the limb

was scarcely inflamed, and no lesion appeared of the interior organs.

Experiment 7th. At half past two, were introduced into the stomach of a very strong dog, four drachms of an aqueous *alkaline* extract of black hellebore, in a solid form, which was prepared by a cold maceration of the dried root in water, sharpened by the sub-carbonate of potash, (this extract forms the base of *Bacher's Tonic Pills;)* the œsophagus was then tied. At half past eight in the evening, the animal experienced some vertigoes; he staggered in walking, and moaned a little. The next morning at nine o'clock he died. The mucous membrane of the stomach was of a cherry-red throughout its whole extent; there was no sensible lesion of the intestines: the lungs, which were in some parts distended with blood, were of a dark colour, inclining to black, and more dense than in their natural state. The ventricles of the brain contained no fluid; the veins running over the surface of this organ were distended with black blood; the pia mater was strongly injected.

Morgagni makes mention of a person who took half a drachm of black hellebore, and expired eight hours after. He experienced some pains, and was seized with vomiting. The whole of the digestive canal was inflamed; the inflammation was greater in the large, than in the small intestines; several portions of the latter presented alternately a state of constriction and relaxation; there was no gangrene: forty-two hours after death, the limbs were still flexible.

794. The preceding facts induce us to believe,

1st. That the powdered roots of white and black hellebore applied to the cellular texture, are rapidly absorbed, carried into the circulation, and give rise to violent vomitings, and different lesions of the nervous system, which the animals speedily sink under, and which seem to bear an analogy to those produced by the narcotics.

2nd. That their local effects are confined to the production

of a slight inflammation, not sufficient to occasion a speedy death.

3rd. That they act in the same manner when introduced into the stomach; but in this case their effect is slower, and less violent.

4th. That it may even happen in this case, that those animals are not destroyed which are allowed the power of vomiting; in the opposite case, their death is a constant result after certain doses.

5th. That the root of the white hellebore is more active than that of the black.

6th. That the part which is soluble in water, is that in which the poisonous property of these two species of hellebore resides.

7th. That the alkaline extract, which forms part of the Tonic Pills of Bacher, is likewise extremely active.*

The fetid hellebore is also capable of producing death. We read in the *London Chronicle*, 1768, No. 1760, that a child lost its life, from taking this root in the pulp of apple. It has likewise been seen, after its use, that persons have lost their hair, nails, and even the epidermis which covers the whole body. (*Oxford Magazine*, for the month of March, 1779, p. 99.)

OF BRYONY.

795. The genus *Bryonia* belongs to the family of the *Cucurbitaceæ*.

Characters. Flowers monœcious or dicecious; calyx short, monophyllous, bell-shaped, with five *teeth*: corolla adhering to the calyx, bell-shaped, or nearly resembling a rose, the border of which has five divisions, oval and veined. *Male flowers*: three stamina, two of which adhere together by means

* The water distilled from black hellebore root acts also upon the nervous system.

of the filaments. *Female flowers:* one style, having three divisions; stigmata grooved; inferior germen, egg-shaped, which, when ripe, becomes a spherical or oval berry, smooth on the outside, containing a small number of seeds.

Bryonia diaica (White Bryony). Stalks about two *metres* in length, slender, climbing, grooved, and somewhat hairy: leaves alternate, petiolated, angular, palmated, cordiform, covered with hairs, rough to the touch, presenting at their base a long tendril, rolled up into a spiral: root very thick, fusiform, externally marked in circles, fleshy, succulent, ramified, of a yellowish white colour, taste acrid, bitter, and disagreeable: flowers small, of a dirty white colour, marked with greenish lines: berries round, of a bright red when come to maturity. This plant is common in hedges. The root of bryony contains a juice extremely acrid, bitter, and soluble, which may be extracted by pressing it, and treating it with water: there remains in that case a feculent matter, which is sweet, and no way corrosive.

ACTION OF BRYONY ON THE ANIMAL ECONOMY.

Experiment 1st. At half past six in the morning, two drachms and forty-eight grains of a fine powder of the dried root of bryony, were applied upon the cellular texture of the interior part of the thigh of a dog of middle size. The animal died at the end of sixty hours, without having appeared to suffer any other symptom than a tolerably sharp pain. On opening the body, no lesion of the digestive canal was observed; the lungs were sound: the limb operated upon, exhibited an inflammation of some extent, which had terminated by suppuration.

Experiment 2nd. At ten in the morning, half an ounce of dried bryony root finely powdered, was introduced into the stomach of a small robust dog, and the œsophagus was after-

wards tied. At two o'clock, the animal did not appear at all incommoded. The next morning he was found dead. The blood contained in the ventricles of the heart was coagulated; the lungs, which crepitated but little, were of a reddish colour, and contained a tolerably large quantity of blood: the stomach, which was very red on the outside, contained almost the whole of the powder ingested; the mucous membrane, which was of a bright red, presented here and there blackish patches, not ulcerated: the interior of the great intestines was exceedingly inflamed; the other parts of the digestive canal were scarcely ulcerated.

Experiment 3rd. The same experiment was repeated at five in the morning, with three ounces of water, in which four drachms of powdered bryony root had been infused for two hours. At six in the evening the animal had experienced no other symptom than a great degree of dejection; he made little attempt to move; but had however no giddiness. He died during the night. At nine in the morning the body was examined: the heart was distended by a tolerably great quantity of blood, partly coagulated, and partly fluid; the lungs were rather red, and contained fluid blood; the mucous membrane of the stomach was of a cherry-red throughout its whole extent; that which lines the rectum was in the same state. The rest of the intestines, with the exception of the commencement of the duodenum, were in their natural state.

A number of observers have attested that the administration of bryony has been followed by violent vomitings, accompanied with faintings, sharp pains, alvine evacuations profuse, and of a serous nature, great thirst, &c.

796. These facts induce us to believe,

1st. That the bryony root acts upon men in the same manner as upon dogs.

2nd. That its effects may depend on the inflammation it produces, and the sympathetic irritation of the nervous system, rather than on its absorption.

3rd. That its deleterious property resides especially in the portion which is soluble in water.

OF ELATERIUM.

797. The *momordica elaterium* (Cucumber of the Ass, Wild Cucumber) is a plant of the family of the *cucurbitaceæ*, arranged by Linnæus in the *monœcia diandria*. It presents upon the same stem, *unisexual flowers* composed of a corolla monopetalous, salver-shaped, with a cylindrical tube, and a border divided into five lanceolated segments, open, with a small tooth. *Male flowers:* three stamina, two of which are connected by the filaments: the anthera are united. *Female flowers:* three stamina abortive: one inferior germen of three lobes, hairy, from which rises a style, which thickens insensibly, and terminates in a stigma clubbed. The fruit is an oval berry, very little fleshy, coriaceous, scarcely the size of the thumb, one-celled, capsular, covered with soft hairy points, opening with elasticity, and projecting the seeds to some distance. These are oval, angular, compressed, protected by an outer coat, and float in an aqueous pulp. The stalks lie on the ground, with a great number of ramifications, are thick, and abound with asperities, which render them prickly and rough to the touch. The leaves are petiolated, heart-shaped, the lateral lobes ear-shaped, scattered; and their petiole especially is thickly armed with prickly hairs. This plant grows in barren and stony grounds.

ACTION OF ELATERIUM ON THE ANIMAL ECONOMY.

Experiment 1st. At eight o'clock, three drachms of solid extract of elaterium dissolved in five drachms of water, were introduced into the stomach of a small strong dog, and the œsophagus was tied. Ten minutes after, the animal experienced

nauseas, and made some efforts to vomit. At half past eight the desire of vomiting returned, and the animal moaned greatly. At a quarter past ten he was lying on his side, without having the power of remaining on his feet for a single moment: his sensibility was diminished to such a degree, that he might be pushed, or moved from his place, without giving any signs of feeling. His breathing was deep, hurried, and was performed in a manner similar to that which takes place in persons labouring under abdominal inflammation; the animal still made efforts to vomit. At two o'clock he was found dead; and the examination of the body took place immediately. The heart no longer contracted; it contained only a small quantity of blackish blood; the lungs were of a rose colour, and less crepitating than in their natural state; they were moderately compact, and not much distended with blood; the stomach contained a certain quantity of a brownish fluid; the mucous membrane was of a fiery red throughout its whole extent, and presented here and there blackish points, without any ulceration; the rectum, which was sprinkled over with spots of a cherry-red colour, was evidently inflamed; there was no alteration in the other intestines; the body was not stiffened.

Experiment 2nd. At ten in the morning, three drachms of the extract of elaterium were injected into the cellular texture of the thigh of a middle sized dog. At two o'clock the animal exhibited no sensible phenomenon. The next morning he was found dead. The digestive canal was sound, except the rectum, the interior of which presented a few rose-coloured spots: the limb operated upon was penetrated by the injection, of a livid red colour, and exceedingly inflamed.

Experiment 3rd. The same experiment was repeated at five in the morning, upon a strong dog of large size. The next morning at seven o'clock, the animal had experienced only some dejection. He expired at three o'clock, and his death was preceded by a general insensibility. On opening the body,

no vestige of injury could be detected in the texture of the digestive canal, except in the rectum, which presented a few red spots; the limb operated upon was tumefied, and very much inflamed; the redness extended from the inferior part of the limb to the third sternal rib; there was a considerable degree of serous sanguineous infiltration; the lungs were sound.

798. These experiments induce us to think,

1st. That the first effects of elaterium are dependent on the inflammation it produces, as much as on its absorption.

2nd. That death, which is the consequence of the administration or application of this substance, must be attributed to the lesion of the nervous system sympathetically affected.

3rd. That besides, it exerts a special action upon the rectum.

OF COLOCYNTH.

799. The Colocynth *(Bitter Apple)* is the fruit of the *Cucumis Colocynthis* (Monœcia *Syngenesia* of Lin.), which belongs to the family of the *Cucurbitaceæ,* and grows in the islands of the Archipelago. This fruit is of the size of an orange, of a yellowish white colour, devoid of smell, round, dry, light, spongy, and composed of membranous layers. It contains a very great number of small cells, within which are lodged the seeds, which are flat, oblong, sweet, and emulsive: it possesses an acrimonious taste, exceeding bitter, and nauseous.

ACTION OF COLOCYNTH UPON THE ANIMAL ECONOMY.

Experiment 1st. The œsophagus of a middle sized dog was detached and perforated at nine in the morning, and three drachms of colocynth in fine powder enclosed in a paper cone,

were introduced into the stomach: the œsophagus was then tied. At two o'clock the animal had passed one liquid stool of a blackish colour. He moaned from time to time, but experienced neither vertigoes nor convulsions. At eight in the evening his respiration was a little accelerated and impeded; he no longer preserved the power of feeling or moving; he might be displaced like an inert mass of matter, and could not keep himself erect for an instant. He was lying upon the side; his legs, which were a little stretched out, without any remarkable contractions of their muscles, were not affected with any convulsive movements. He died at midnight.

Dissection. The stomach, in its interior, exhibited a violet red colour; it was distended with a great quantity of solid food, and a fluid, in which the powder of Colocynth was suspended. The mucous membrane of this viscus was strongly inflamed throughout its whole extent; it appeared of a blackish red colour in the portions corresponding with its great extremity, and in all its other parts, of a bright red: that which lined the duodenum, jejunum, ileum, cœcum, and the first quarter of the colon, was of a tolerably bright red: there was no alteration in the rest of the colon; but the rectum exhibited a very considerable number of patches of a fiery red.

Experiment 2nd. At eight in the morning a dog of middle size was made to swallow a Colocynth apple, which he vomited almost entire an hour after. The next day at eleven o'clock, his œsophagus was detached, and five ounces of white wine, in which two drachms of Venice Colocynth had been infused for six hours, were introduced into the stomach, and the œsophagus tied. At one o'clock the animal had made no effort to vomit. At six he passed two liquid stools, and complained with some vehemence. He died in the night. The lungs, stomach, duodenum, and the other small intestines exhibited no remarkable alteration: the mucous membrane of the rectum,

and of the inferior portions of the colon, was of a deep purple red. The subjacent muscular coat was likewise inflamed.

Experiment 3rd. Eight ounces of white wine boiling, were poured upon half an ounce of Venice Colocynth cut into small fragments. At the end of three days the liquor was poured off, and evaporated, to get rid of the alcohol; it was then introduced into the stomach of a dog of middle size, whose œsophagus had been previously detached and perforated. The next day the animal uttered complaints, was dejected, and passed two copious stools. He died twenty hours after the operation. The mucous membrane of the stomach was for the most part of a tolerably bright red colour; and exhibited here and there portions of a deep red; that which lined the duodenum and jejunum presented a similar alteration. The ileon, cœcum, and superior portions of the colon, were almost in their natural state; the interior of the rectum, and inferior portion of the colon, were the seat of a very considerable inflammation: several projecting bands of a blackish red colour were seen raised upon a ground of fiery red. The lungs appeared in their natural state.

Experiment 4th. At noon, a wound was made on the interior of the thigh of a dog of middle size; it was then sprinkled over with two drachms of Colocynth finely powdered, and the lips united by a few stitches. The next day at four in the morning, the animal did not appear very much incommoded; he uttered no plaintive moan, and walked about freely. He died in the night.

Dissection. The mucous membrane of the rectum was evidently altered; almost the whole of its surface was covered with points of a blood-red colour; the other portions of the digestive canal, and the lungs, shewed no visible lesion. The limb operated upon presented a tolerably extensive inflammation, accompanied by a sanguineous infiltration, which principally occupied the inferior parts. There was no eschar.

Experiment 5th. Two ounces of Colocynth finely powdered were digested for eight days in water; the liquor was then evaporated nearly to the consistence of a syrup, and was introduced at noon into the stomach of a dog of middle size, whose œsophagus had previously been detached and perforated. At half past twelve, the animal made violent efforts to vomit. At a quarter past four, he staggered, and experienced such giddiness that he fell down on making two or three steps. He still preserved however the use of his senses, and uttered no cry. At six, he shewed scarcely any signs of life; he might be displaced like an inert mass of matter, he was not agitated by any convulsive movements. At half past eight, he continued in the same state. He died at eleven at night.

Dissection. The stomach contained a part of the ingested liquor, mixed with a viscous blackish fluid; the mucous membrane was of a deep red colour, and exhibited streaks of a blackish red; the muscular coat was of a cherry red; the small intestines, cœcum, and colon, appeared very little altered; the mucous membrane of the rectum was extremely inflamed, and presented some longitudinal bands of a fiery colour: the lungs, which were somewhat distended with black blood, were nevertheless sufficiently crepitating. The veins situated on the surface of the cerebral lobes were very much distended with black blood; the pia mater was strongly injected, but no fluid was found in the ventricles of this organ.

Experiment 6th. At noon, a small dog was made to swallow fasting three drachms of Colocynth, which had been previously treated by boiling water until this fluid became colourless and insipid: the œsophagus was tied. The animal made some efforts to vomit: four hours after, he experienced some vertigoes, and died in the course of the night. The stomach was a little inflamed on its interior; a very slight alteration was just perceptible in the rectum.

Observations.

1st. A woman was subject to colics for the space of thirty years, in consequence of having taken an infusion of the pulp of Colocynth prepared with beer. (Fordyce, *Fragmenta Chirurg. et Med.* p. 66.)

2nd. A person took the decoction of three apples of Colocynth: he had copious and bloody alvine discharges; and would have sunk under them, if oil had not been speedily administered to him in glyster and by the mouth. (Tulpius, *Obs.* lib. iv. c. xxvi. p. 218.)

3rd. Dioscorides has observed, (lib. iv. c. clxxviii) that Colocynth, introduced into the rectum, produced a bloody flux.

4th. Lebret, a rag-merchant, swallowed three ounces of Colocynth, with the hope of getting rid of a gonorrhœa, with which he had been attacked for several days. A short time afterwards he felt severe pains in the epigastrium, and vomited abundantly. At the expiration of two hours he had copious alvine evacuations; the lower extremities became bent, his sight was obscured, and he could only hear with great difficulty; a slight delirium came on, which was succeeded by vertigo. He was made to drink a great quantity of milk, which produced vomiting: ten leeches were applied to the abdomen, and the symptoms subsided by degrees. *(Report made by the patient.)*

800. These data tend to prove:

1st. That the effects of Colocynth depend chiefly on its local action, and on the sympathetic irritation experienced by the nervous system.

2nd. That it is nevertheless absorbed and carried into the circulation, and that it acts also directly upon that system, and on the rectum.

3rd. That the active principle of this medicine resides both

in the portion soluble in water, and in that which is insoluble.

4th. That it acts on men as on dogs.*

OF GAMBOGE.

801. Gamboge is a gum-resin, obtained in the kingdoms of Siam and Ceylon, by making incisions in the leaves and young sprouts of the *Stalagmitis Gambogioides* (*Polygamia Monœcia*, WILD.). The wood of the *Gambogia Gutta*, L. (Polyandria Monogynia) furnishes likewise on incision, this substance in the form of a juice, which speedily concretes.

Gamboge is solid, of a deep yellow colour, bordering on red, becoming of a clear yellow on being moistened or powdered; of a shining fracture, very friable, opaque, without smell, or taste, at least if not allowed to remain too long in the mouth, in which case it gives out a taste slightly acrid; it dissolves partly in water and in alcohol, to which it communicates a yellow tinge. Alcohol thus charged furnishes on the addition of water, a yellow precipitate, which is thrown down with the greatest difficulty. The solution of potash entirely dissolves Gamboge; this solution is not rendered turbid by water; but is decomposed by the acids, which precipitate from it a substance of an extremely beautiful yellow colour, soluble in an excess of the acid.

* It should be remarked in the experiments relative to Colocynth and Elaterium, that when these poison have produced death, after being received into the stomach, this viscus and the rectum are found to be inflamed, whilst the great bulk of the small intestines are in their natural state. This peculiarity exists, likewise, in a considerable number of poisonous substances; it appears to depend on the rapidity with which a part of the poison passes through the small intestines, and their long continuance in the stomach and rectum. It cannot be allowed, that it is always by virtue of a special action on this intestine that inflammation takes place; for it often fails when the poisonous substance has proved fatal, after having been injected into the cellular texture of the thigh.

ACTION OF GAMBOGE ON THE ANIMAL ECONOMY.

Experiment 1st. At ten in the morning, a small dog was made to swallow a drachm of Gamboge finely powdered. At the end of an hour he vomited some alimentary matter of a saffron colour, mixed with a certain quantity of the powder ingested. Ten minutes after, he vomited afresh; the animal was a little dejected. The next day he was perfectly recovered; he ate as usual, and had no more alvine evacuation. The following day he was made to swallow again two drachms forty-eight grains of Gamboge. At the end of an hour he vomited three times some yellow matter, and three hours after, he fed with a tolerable appetite: three days after, he was perfectly well. His œsophagus was detached and perforated, and a drachm and half of Gamboge, diluted with two ounces of water, were introduced into the stomach. He soon made efforts to vomit, and in the course of eight hours, passed a yellowish stool, tolerably copious. He died in the night. The mucous membrane of the rectum, and the descending half of the colon was of a red colour; the stomach, the other intestines, and the lungs, shewed no sensible alteration.

Experiment 2nd. At eight in the morning, a small stout dog was made to swallow fasting a drachm and half of Gamboge finely powdered; immediately after, the œsophagus was detached and tied. At the end of five hours the animal had passed several liquid stools of a yellow colour; he moaned, was dejected, and breathed with difficulty; there was neither convulsion nor paralysis. He died at six in the evening.

Dissection. The stomach was injected on the exterior, of a reddish colour, and presented in its interior a small quantity of a viscous fluid, of a brownish colour: its mucous membrane was for the most part red, and presented, in the folds near the pylorus, a deep red colour; the duodenum and jejunum were

slightly inflamed; the rectum was covered with a thin coat of Gamboge, and scattered over with a considerable number of streaks of a deep red colour. The lungs, which were rather livid, were less crepitating than in their natural state.

Experiment 3rd. At ten in the morning, the œsophagus of a dog of middle size was detached and perforated, and four drachms of Gamboge finely powdered, enveloped in a paper cone, were introduced into the stomach; the œsophagus was then tied. At two, the animal made violent efforts to vomit, but did not appear to be much incommoded. At eight in the evening he made no complaint, and preserved the free use of his senses and of his limbs; respiration was carried on nearly in the natural way. The next morning at ten o'clock, he was found dead. The stomach contained about four ounces of a fluid of no great consistence, in which was suspended the greatest part of the Gamboge; the mucous membrane of this viscus was covered with a thin coat of this gum-resin which could not be detached but by a scalpel; it then appeared of a fiery red colour, and dotted over with a multitude of points equally coloured. Some reddish spots were seen in the interior of the rectum. The other intestines were coated with a stringy yellowish matter, but presented no remarkable alteration. The lungs, which were of a deep red colour, were less crepitating than in their natural state, and distended with black blood.

Experiment 4th. At ten in the morning, a wound made in the thigh of a dog of middle size, was powdered with two drachms forty-eight grains of Gamboge finely powdered, and the edges were united by a few stitches. At eight o'clock, the animal had not had any evacuation; he walked well, and made no complaint. The next morning he was found dead. The digestive canal was nearly in the natural state; the lungs crepitated but little, were of a colour rather livid, and contained some black blood. The limb operated upon was inflamed and infiltrated; the inflammation and serous infiltration extended up the side to the sixth sternal rib. There was

a great quantity of Gamboge in the wound itself, and no eschar was perceived.

Experiment 5th. The foregoing experiment was repeated on a dog of the same size. The next day, at two in the afternoon, (twenty-four hours after the operation,) the animal walked about very well without making any complaint, and had no convulsive movement. He died in the course of the night. No alteration was perceived in the digestive canal, the excrementitious matter contained in the great intestines was of a yellowish colour. The limb on which the wound had been made exhibited a very considerable serous infiltration, and all the neighbouring parts were stained yellow by means of a slight coating of Gamboge. There was no eschar.

802. From these experiments it results :

1st. That Gamboge may be taken in a tolerably strong dose into the stomach of dogs that are suffered to vomit, without producing any serious accidents.

2nd. That in the contrary case it occasions a speedy death, which does not appear to depend on its absorption, but on the powerful local action it exerts, and on the sympathetic irritation of the nervous system.

3rd. That it destroys life rapidly when applied to the cellular texture, and that its effects are similar to those of an extensive burn, which produces no eschar.

OF THE FLAX-LEAVED DAPHNE *(DAPHNE GNIDIUM).*

803. This shrub belongs to the Octandria Monogynia of L. and the family of the *Thymalææ* of Jussieu. It is also vulgarly called *(Sainbois)* Spurge-flax.

The perigone (calyx) in form of a tube swelled out and contracted at its orifice, and which appears to serve for the corolla, of which the flowers of this plant are destitute ; whitish or reddish, divided into four lobes, and covered with a down

almost cotton, supported by a pubescent peduncle; eight stamina, with short filaments inserted into, and enclosed in the tube of the calyx; one short style with a headed stigma: one germen. The fruit is an oval or spherical berry, containing a succulent pulp, beneath which a thin shell is found, having one cell and one single seed; flowers small, in a panicle not much expanded: the stem two or three feet in height; divided from its base into several extended branches, abundantly furnished with leaves which are lanceolated, linear, very smooth, terminating in an acute point, scattered, numerous, close together, and near the summit of the branches almost imbricated. The Spurge-flax grows in dry and mountainous places in the southern provinces.

Character of the Bark. Fragments very long, not very thick, extremely flexible; outer skin brown, smooth, and yellowish on its internal surface. This bark has no smell; its fracture is fibrous, its taste acrid and burning.

ACTION OF THE FLAX-LEAVED DAPHNE ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, a dog of middle size was made to swallow a drachm and half of the bark of Flax-leaved Daphne, reduced to a fine powder. Immediately afterward the animal's mouth was filled with foam, and he uttered plaintive cries. At half past ten, he vomited some alimentary matter mixed with something fluid, and refused to take food: he was somewhat dejected; the motion of the heart was somewhat more accelerated than before the operation. The next day he was in good health, and ate heartily. The day following at nine in the morning, his œsophagus was detached and perforated; three drachms of the same powder inclosed in a paper cone were introduced into the stomach, and the œsophagus tied. At three o'clock, he appeared very much dejected, without complaining; he had passed no stool, and the organs of sense

and motion retained all their faculties; the pulsations of the heart were frequent and slightly intermitting. At six in the evening, he was lying on the side, in a state of great dejection, and could not keep on his feet without the greatest difficulty. When it was attempted to make him walk, he fell down again, in order to lie on his side. The pulsations of the heart were scarcely perceptible, and slow; the animal exhibited no signs of convulsion or paralysis. He died at eleven o'clock at night.

Dissection. The stomach was distended, and of a livid red colour on the exterior. On opening it, it was observed to contain some considerable quantity of venous blood in a fluid state, mixed with a stringy blackish fluid, in which was suspended part of the powder ingested. The mucous membrane of this viscus was of a blackish red colour in several points, in others black; and exhibited here and there a very considerable number of small ulcers; the portion next the pylorus was hard, as if tanned; the muscular and serous coats were extremely red, and separated by a certain quantity of blood of a deep black colour; the effusion of this fluid was still more abundant between the mucous membrane and the subjacent coat. The interior of the duodenum was inflamed, and the redness diminished in the other small intestines, in proportion to their distance from the stomach. The rectum was very much inflamed; its mucous membrane presented generally a cherry-red colour; the lungs were somewhat hardened, and less crepitating than in their natural state.

Experiment 2nd. At two o'clock an incision was made in the interior part of the thigh of a small dog; the wound was then sprinkled with three drachms of Flax-leaved Daphne, finely powdered, and the lips of the wound were united by a few stitches; the animal uttered acute cries at the moment of the application of the bark. The second day after, at eight in the morning, he had not shewn any remarkable symptom; he was dejected, and remained in a corner of the laboratory; he

could nevertheless walk about freely enough. At ten o'clock his sensibility was diminished, and at two he remained lying on the side, without giving the smallest sign of feeling on the most violent agitation: his inspirations were rare and deep. He died at four. The digestive canal exhibited no trace of alteration; the inflammation in the limb operated upon, which was tolerably extensive, was accompanied by a copious sanguineous infiltration.

Vicat asserts that the Flax-leaved Daphne has given rise to a fatal diarrhœa.

The *Daphne Mezereum, Cneorum,* &c. produce nearly the same effects. Linnæus reports, that a young lady, labouring under intermittent fever, died spitting blood, from having taken twelve berries of the *Daphne Mezereum,* which had been given her with the design of purging her. (*Flora Suecica,* No. 338.)

Some person having given to an hydropic patient, the wood of Mezereon, the latter was all at once attacked with a diarrhœa, which was continual, and accompanied with insupportable pains; he had beside, for six weeks, vomitings, which returned every day with extreme violence, although, during the whole of that time, every proper remedy was had recourse to, in order to quiet them. (Vicat, *Histoire des Plantes Vénéneuses de la Suisse,* p. 140.)

804. The facts just described induce us to think:

1st. That the bark of the *Daphne Gnidium* is not absorbed.

2nd. That it gives rise to very powerful local inflammation; and sympathetic irritation of the nervous system, to which the fatal symptoms resulting from its administration ought to be attributed.

3rd. That it appears to exert the same action on the human species, as on dogs.

OF THE PALMA CHRISTI (RICINUS.)

805. The Palma Christi *(Ricinus Communus)* is a native of the Indies, and of Africa, of the Monœcia Monadelphia L., and of the family of the *Tithymaloides.*

Characters. Flowers unisexual, disposed in a spike paniculated and terminal, the inferior male, superior female. *Male flowers:* calyx, with five deep divisions; stamina numerous; filaments branching out; united in a bundle at their base. *Female flowers:* calyx parted off in three segments; germen, almost spherical, surmounted with three styles; cleft in two, and with simple stigmata. *Fruit:* greenish capsule, covered with soft prickles, with three furrows; having three valves, and three cells, containing each a single seed: stem reddish, branching, cylindrical, hollow, smooth: leaves palmated, with pointed and serrated lobes, and glandular petioles.

Characters of the Seeds. Oblong, flattened, oval, blunt at the extremities; shell brittle, thin, smooth, and spotted with black, of a very acrid taste; the nut whitish, insipid, oily.

ACTION OF THE FRUIT OF PALMA CHRISTI ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, a small dog tolerably strong, was made to swallow thirty grains of the fruit of Palma Christi, in as great a state of division as possible. At the end of twenty minutes, he vomited without any effort some white matter, stringy and liquid, in which the ingested fruit was observed. At nine, he passed a stool, partly liquid, partly solid, and experienced no further inconvenience; in the course of the day he fed heartily. The following day at noon, a drachm and half of the same fruit suspended in two ounces of water, were introduced into the stomach, and the œsopha-

gus was tied, to prevent vomiting. An hour after, he had made no efforts to vomit, nor had passed any stool; he was dejected. At four o'clock, he passed a solid stool; he complained greatly, and died at six o'clock.

Dissection. The stomach contained a little fluid matter, in which was swimming some portions of the fruit of Palma Christi; the mucous membrane of this viscus, which lined the great extremity, was little inflamed, but easily detached in pieces: the intestinal canal and lungs presented no remarkable alteration.

Experiment 2nd. At nine in the morning, two drachms of the fruit of Palma Christi bruised, and enclosed in a paper cone, were introduced into the stomach of a dog, and the œsophagus was tied, to prevent vomiting. At the end of three hours, the animal had two stools, and he had already made several fruitless efforts to vomit. At four in the evening, he was extremely dejected, and moaned greatly, but preserved the free exercise of his senses and limbs. He died in the night. The mucous membrane of the stomach was only affected near the pylorus, where a circular patch was observed of a scarlet colour, as large as a crown of six francs, ulcerated in several places: these ulcers did not affect the subjacent coats. The interior of the rectum presented here and there inflammatory spots of a bright red colour. There was no sensible alteration in the other organs.

The same experiment was repeated at noon, upon another small dog with three drachms of the fruit of Palma Christi. Seven hours after, the animal had made some efforts to vomit, and passed one stool. The next day at noon he was expiring, in a state of complete insensibility, and could no longer stand upon his legs. He died a quarter of an hour after, without having exhibited any other phenomena than two or three deep inspirations, and a separation of the hind legs, which were somewhat stiff. He was immediately opened. The heart had ceased to beat; it contained fluid blood, and of a tolera-

bly bright red colour in the aortic cavity. The lungs were sound; the stomach contained a tolerable large quantity of yellowish matter, as it were oily, and mixed with curds likewise yellow; the mucous membrane was very little inflamed; the interior of the rectum presented here and there patches of a bright red. There was no alteration in the other parts of the digestive canal.

Experiment 3rd. Three drachms of the seeds of Palma Christi, deprived of their ligneous envelope, were introduced into the stomach of a dog of middle size; and the œsophagus was tied. The next day, he shewed no remarkable symptom. The day following, at eight in the morning, he experienced very severe vertigoes; it was impossible for him to walk without falling; he did not moan. At noon, he kept himself lying on the side, in a high degree of insensibility; his inspirations were rare and deep; the pulsations of the heart natural. He died at two o'clock. The mucous membrane of the stomach was not very red, and exhibited some small ulcers, the centres of which were black; the rectum, which was extremely red, was inflamed in its interior; the lungs, though crepitating, contained a small quantity of venous blood.

Bergius relates, that a robust man chewed a seed of Palma Christi, which he afterwards swallowed, and which produced a stinging sensation in the fauces. He passed the night quietly; but the next morning had copious vomitings, and during the whole day he made alternately efforts to vomit, and to go to stool, without however passing much.

806. These facts tend to prove that the seeds of the Palma Christi produce a local irritation, and that they act upon the nervous system after being absorbed.

OF EUPHORBIUM *(EUPHORBIA OFFICINARUM).*

807. A plant of the family of the *Tithymaloides* of Jussieu,

and of the Dodecandria Trigynia of Lin. It is however Monœcious.

Characters of the Genus. Flowers composed of one calyx (looked upon by some botanists as an involucrum, and by others as a corolla) of one single piece, in form of a bell, permanent, having from eight to ten lobes, of which four or five are interior, straight, membranous, sometimes approaching at their summit, oval, pointed, and of an herbaceous colour; the other four or five, called *petals* by Linnæus, are alternate with the former, somewhat coloured, expanded, fleshy, oval, or heart-shaped, or in form of a crescent, having sometimes very remarkable teeth. *Male flowers:* to the number of eight or fifteen having a perigone concealed in the involucrum, composed of fine threads laciniated on the side (regarded by Linnæus as barren filaments); they have only one stamen each, every filament of which is articulated in the middle. *Female flowers:* single in the centre of the calyx, sometimes wanting; it appears deprived of its perigone; superior germen, rounded, three-sided, borne on a pedicle, inclined, or hanging on the side of the flower, surmounted by three bifid styles, with blunt stigmata. The fruit is a capsule rounded, smooth, or hairy, or having excrescences on the outside, borne on a pivot curved outwards, and formed of three shells joined together, each containing one roundish seed. The Euphorbia are all lactescent.

The *Euphorbia Officinarum* has the stem naked, with several angles, and the thorns double. There flows from its stalk a milky juice, which dries in small brittle pieces, which bear the name of *Euphorbium*, and with which we made the two following experiments.

Euphorbium is in irregular tears, frequently perforated; its colour is reddish on the exterior, and whitish within: it has no smell, its fracture is vitreous: when reduced to powder, it irritates the nostrils, even at a great distance.

ACTION OF EUPHORBIUM ON THE ANIMAL ECONOMY.

Experiment 1st. At one o'clock, the œsophagus of a very strong dog was detached and perforated: half an ounce of Euphorbium finely powdered, and enclosed in a paper cone, was introduced into the stomach. A quarter of an hour after, the animal uttered piercing cries, and made some efforts to vomit. The next morning at seven o'clock he was dejected, and continued to suffer pain. He died at three in the afternoon, without having shewn any other remarkable phenomenon than a great degree of dejection and insensibility.

Dissection. The stomach was very bulky; it appeared of a blackish red on the outside. On opening it, it was found to contain a very considerable quantity of a red, bloody fluid, mixed with powder of Euphorbium. The three coats of this viscus, and especially the mucous membrane, were black, or at least of a very deep red: the duodenum, jejunum, ileon, were little altered, and covered with a considerable quantity of a brown fluid, which was easily detached; the colon, and more particularly the rectum, were the seat of a remarkable alteration: the mucous membrane of the latter of these intestines, was of a fiery red colour in its inferior half, and exhibited three longitudinal bands of two lines in diameter, projecting, of a blackish red colour, and separated by some small ulcers; in its superior half it was black as charcoal, and exhibited likewise some small ulcers. The colon was considerably affected, yet much less than the rectum. The lungs did not appear to have been sensibly injured.

Experiment 2nd. At eight in the morning, a wound was made in the interior part of the thigh of a dog of middle size; it was sprinkled over with two drachms of Euphorbium finely powdered, and the lips of the wound united by a few stitches. The next day the animal was somewhat dejected, he uttered

no plaintive cry, and preserved the use of his senses and of motion. He died at half past eleven. The stomach, the intestinal canal, and lungs, were sound. The limb operated upon was very much inflamed; the redness, and sanguineous infiltration extended from the inferior extremity of the bone of the leg, up to the fifth sternal rib. There was no eschar.

Francis Dashwood (Philosophical Transactions p. 662, *year* 1760) asserts, that Mrs. Willis took by mistake, eighteen days after her lying in, two ounces of tincture of Euphorbium, prepared with two drachms of camphor, two ounces of rectified spirit, and two drachms of Euphorbium. Immediately after, she experienced a violent suffocation, a burning, and intolerable pain in the mouth and stomach. Mr. Willis administered, a few minutes after, a very great quantity of warm water, which produced copious vomitings. The patient complained however of a burning heat at the stomach; she was then made to take alternately oil and water; the vomitings continued. Some time afterwards Mr. Dymock ordered an ounce of ipecacuanha wine, which procured copious evacuations, both upwards and downwards; the matter evacuated was oily and camphorated: milk, and an opiate draught soon restored tranquillity. The phenomena produced by this draught ought to be attributed both to the Euphorbium and camphor. (See the article *Camphor).*

Experiment 3rd. At eight in the morning, eight ounces of the juice proceeding from the fresh leaves of the *Euphorbia Lathyris* (spurge), were introduced into the stomach of a very strong dog of middle size, and the œsophagus was tied. Three quarters of an hour after, the animal made efforts to vomit, and had passed three stools; he suffered only during the day some dejection. The next day at six in the morning, he continued to make efforts to vomit; the dejection was increased, and the animal remained lying upon the belly, without attempting to stir; he nevertheless preserved the power of

moving freely. At eleven, he began to agitate his feet in a convulsive manner: he died at noon. The next day he was opened. The lungs were livid, dense, distended with blood; the rectum presented here and there reddish spots; the other portions of the digestive canal were sound.

Sproegel reports that he gave to a cat twenty grains of the juice of Spurge, mixed with a little milk; which produced violent jerking of the head, cough, sneezing, trembling, and convulsions over the whole body. The animal was soon purged; from that time the cough ceased; the breathing became impeded, and was accompanied with a hissing noise; he made fruitless efforts to vomit, became motionless, and the eyes were closed. Some bread with milk and roots were given him; he vomited these, coughed afresh, and in the end recovered. The same writer applied upon his own face some of the juice of Spurge, which excited pustules similar to those of the nettle-rash.

This poison has been sometimes administered imprudently as a purgative, and produced vomitings and bloody stools: applied to the hairs, and to warts, it causes them to fall off: which proves that this plant is excessively acrid.

Experiment 4th. At seven in the morning, five ounces of the fresh juice of *Euphorbia Cyparissias* were given to a small robust dog, and the œsophagus was tied. The animal went several times during the day to stool. The next day he was dejected. The day following, he was still more so, but preserved the free use of his senses and of motion. He died in the night. The rectum exhibited some spots slightly red; the other organs appeared sound.

Vicat makes mention of a man who had his face excoriated, from having it rubbed with the juice of this Euphorbium. Lamotte speaks of a glyster prepared with this plant, which had been taken instead of mercury, the effect of which proved fatal.

There are a great many species of Euphorbia, which

are poisonous: such as, *Euphorbia Antiquorum, Euphorbia Canariensis, Euphorbia Tirucalli, Euphorbia Peplus, Euphorbia Helioscopia, Euphorbia Verrucosa, Euphorbia Platiphyllos, Euphorbia Palustris, Euphorbia Hiberna, Euphorbia Characias, Euphorbia Amygdaloides, Euphorbia Sylvatica, Euphorbia Exigua, Euphorbia Mauritanica, Euphorbia Nerifolia, Euphorbia Esula.*

Scopoli asserts that this last species produced death in a woman who, half an hour before, had swallowed thirty grains of the root of it. In other circumstances the same author has witnessed gangrene of the abdomen, and death to succeed quickly to the imprudent application of the *esula* to the abdomen. He moreover makes mention of a person who, having the eye-lids closed, allowed them to be rubbed with the juice of this plant. Inflammation soon after declared itself, and was followed by the loss of the eye.

808. It results from these facts:

1st. That Euphorbium exerts a local action extremely violent, capable of producing acute inflammation;

2nd. That its fatal effects depend rather on the sympathetic irritation of the nervous system, than on its absorption;

3rd. That it appears to act on the human species as on dogs.

OF SAVINE.

809. Savin *(Juniperus Sabina)* ranged by Jussieu in the Coniferæ, belongs to the Diœcia Monadelphia of Linnæus.

Male flowers: arranged in small catkins, egg-shaped, and sessile, disposed in three rows of verticillated scales, to the number of three in each row. These catkins comprise about ten flowers; that is to say, nine verticillated, three by three, and the tenth terminating the catkin. The scales are peltate, broad, lying one upon the other, and fixed to the axis of the catkin by very short peduncles: the flower has no corolla;

but there are found from four to eight anthera almost sessile, and with one cell. *Female flowers:* in globular catkins, formed of three concave scales, close together; at the base of each of them is a germen, the stigma of which is moist. The fruit is a small berry of a dark blue colour, nearly round, fleshy or succulent, formed by the union of the scales of the female catkin, which are thick, and glued together: it has on its summit three small points or eminences, produced by the superior scales of this catkin, and it contains three osseous seeds, oblong, angular on one side, and concave on the other; shrub from six to ten feet high, the bark of which is rough, and a little reddish; very branching; leaves extremely small, very closely pressed one to another, lodged upon the branches, which gives them the appearance of being imbricated; sharp-pointed, erect, opposite alternately, decurrent at their base; those at the extremity of the superior branches are somewhat loose; they all possess a strong penetrating smell, and a taste bitter, aromatic, and resinous. It grows in the southern provinces, and in the Levant, &c.

ACTION OF THE LEAVES OF SAVINE ON THE ANIMAL ECONOMY.

Experiment 1st. Six drachms of powdered Savine were introduced into the stomach of a large dog, and the œsophagus was tied. At the expiration of five minutes he uttered plaintive cries. Ten minutes after, the pains of the abdominal region appeared to be very severe, and the animal made great efforts to vomit. He died in the night, sixteen hours after the ingestion of the poisonous substance. The stomach contained a tolerably large quantity of free Savine, which preserved its aromatic smell: the mucous membrane, though not very red, was nevertheless inflamed; a small ulcer was found near the pylorus. The interior surface of the intestines, which was lined with a mucous and bilious matter, presented no

sensible alteration except in the rectum, where some reddish spots were seen.

Experiment 2nd. The same experiment was repeated upon a small dog, with four drachms of Savine. The animal died thirteen hours after the operation, and the interior of the stomach was found of a bright red colour; the rectum was likewise a little inflamed.

Experiment 3rd. At half past two an incision was made in the internal part of the thigh of a small robust dog; the wound was sprinkled over with two drachms of a fine powder of Savine, and the lips were brought together with a few stitches. The next day at noon, the animal presented no remarkable symptom; he died however in the night. The lungs and stomach were sound; the duodenum presented, near the pylorus, a blackish circular spot, of about one line in thickness, formed by extravasated blood; the mucous membrane, which formed a part of this circle, was of a deep red throughout its whole texture. There were, in the mucous membrane of the rectum, several spots of an obscure red. The limb operated on was infiltrated, and very much inflamed.

810. It results from these experiments,

1st. That Savine exerts a local action tolerably energetic;

2nd. That its effects depend principally on its absorption, and its action on the nervous system, the rectum, and stomach.

OF THE *RHUS RADICANS* AND *TOXICODENDRON.*

811. The *Rhus Radicans* is a plant of the family of the Terebinthaceæ of Jussieu, and ranked by Linnæus in the Pentandria Digynia.

M. Bosc, to whom we are indebted for some most excellent observations on this plant, has assured himself that it is only a variety of the *Rhus Toxicodendron,* from which it

differs only by its leaflets, which are smooth, and very entire; so that they ought to be confounded under the common denomination of *Rhus Toxicodendron.* The following is the description given by this enlightened naturalist, of this latter species.

" Root woody, horizontal, reddish, with fibres not very " numerous : stem woody, radicant, branchy, frequently " flexuose, brittle : the bark of a brown gray colour : branches " alternate, similar in every respect to the trunk; the supe- " rior ones only are radicant, the inferior perpendicular to " the trunk : the whole lengthened out, slender, seldom " branching, and only bearing leaves and flowers at their " extremity, upon the shoot of the year. The radicles radi- " cant, more or less numerous, they arise below the lowest " leaf, at the extremity of the shoots of the preceding year. " Leaves alternate, ternate, rising generally to the number of " four or five on the shoot of the year: the common petiole, " swelled out at its base, almost cylindrical, more or less " hairy, from two to three inches in length, and one line " in diameter; the leaflets oval, lanceolated, acuminated, " sometimes angular, sometimes entire, sometimes smooth, " sometimes hairy; but always most on the inside, and still " more on the ridges; the middle ones three inches in length, " and two in breadth; the inferior ones almost sessile, un- " equally divided by the great ridge; the superior one petio- " lated to a great length; the angles, when any, are always in " small number, always obtuse, and shewing themselves only " at the half, or more frequently two thirds of its length. " Fructification dicœcious, having axillary thorns; the thorns " compound at the base, simple at the top, in the same " number as the leaves; the common axis flexuous, some- " what hairy, about an inch in length; flowers pedunculated, " single; the peduncles alternate, perpendicular to the axis, " scarcely one line in length : calyx of five leaves, attached to " a fleshy receptacle: the leaflets almost oval, smooth, cadu-

" cous, of a whitish green, scarcely half a line in length;
" corolla of five petals attached to a receptacle: petals lan-
" ceolated, caducous, twice as long as the calyx, smooth,
" curved back, and turned outward, of a white green, some-
" times veined with brown; stamina five in number, attached
" to the receptacle, shorter than the corolla: thread flattened,
" broader at its base, red: anthera yellow, almost oval, ex-
" cavated by a longitudinal groove; pistillum having an oval
" germen, very hairy, with a style thick, short and smooth,
" three brown stigmata, sessile, one of which is always bigger
" than the rest: fruit, a dry berry, nearly round, hairy, sul-
" cated by seven or eight longitudinal furrows, containing
" only one single seed. This plant is dicœcious." *(Acts of the Society of Medicine of Brussels.)* It is extremely common in Carolina.

ACTION OF *RHUS RADICANS* ON THE ANIMAL ECONOMY.

Experiment 1st. A small dog was made to swallow three drachms of the dried powder of *Rhus Radicans:* the animal experienced no inconvenience.

Experiment 2nd. Two drachms and a half of the aqueous extract of *Rhus Radicans,* were applied upon the cellular texture of the back of a small dog; three days afterwards, the animal had not exhibited any remarkable phenomenon.

Experiment 3rd. At seven in the morning, half an ounce of the same extract was applied to the cellular texture of the interior part of the thigh. At ten, the animal had experienced nothing; it was still the same at six in the evening. The next day, at ten in the morning, he began to be somewhat dejected. At half past ten in the evening, he was insensible and motionless; respiration was scarcely carried on any longer; he could not possibly keep himself on his legs. A quarter of an hour after, he made two or three deep inspirations, and

died. He was opened the next day. The digestive canal was empty, and presented no lesion; the wound was slightly inflamed, and the limb operated on exhibited a serous sanguineous infiltration.

Experiment 4th. At eight in the morning, half an ounce of a watery extract of *Rhus Radicans*, was introduced into the stomach of a dog of middle size, and the œsophagus was tied. The next day, at ten in the evening, the animal had not yet appeared to be incommoded. The day after, at seven in the morning, he began to be dejected; he preserved however the free use of his senses and movements, and uttered no moans. At ten o'clock, he had very strong vertigoes, and fell down whenever made to walk; his head appeared heavy, his pupils somewhat dilated; he saw and heard well enough; the respiration was slow and rather impeded; there was no convulsion; he made no moaning. At one o'clock he was found dead, and the body was opened. The stomach contained a tolerably large quantity of a brownish and viscid fluid; the mucous membrane of a bright red in patches, evidently inflamed; no alteration in the intestinal canal; the blood in the cavities of the heart of a dark red colour, and fluid; the lungs red, extremely crepitating, containing a small quantity of blood.

Experiment 5th. A drachm of the same extract dissolved in three drachms of water, was injected into the jugular vein of a very robust dog. An hour and half after, the animal had vomited at six times, some bilious mucosities, and had passed one stool. The next day he was in admirable health. Thirty grains injected into the jugular vein of a small dog furnished similar results.

Experiment 6th. The same experiment was repeated upon a small dog, with one drachm six grains dissolved in two drachms and a half of water. He panted much, and appeared suffocated. He was put down on the ground, and was so insensible, that he was considered dead. He expired

one minute after, in the midst of a very evident trembling of the muscles of the whole body. He was instantly opened. The blood contained in the heart was fluid, and of a deep red colour in the left ventricle; the lungs in their natural condition.

Observations.

1st. The celebrated *Fontana* relates, that having touched at three different times, and at the interval of several days, some leaves of *Toxicodendron,* he experienced some serious symptoms: four or six days after, the eye-lids, the extremities of the ears, and in general every part of the face became tumefied, and appeared to be filled with an aqueous fluid. The spaces, which separate the fingers, became red, and were covered with small vesicles full of a transparent humor; the epidermis came off in little scales, and he felt a terrible smarting for the space of a fortnight, and an insupportable itching afterwards, for a fortnight longer; the pulse was greatly agitated. M. M. *Gouan* and *Amoreux,* have fully proved these vesicating effects on the skin.

The milk of these leaves produced no phenomenon when applied upon the cellular texture of rabbits, guinea pigs, and pigeons; the same thing happened when they were made to swallow it.*

2nd. *M. Boullon,* Physician of Abbeville, inoculated himself with the juice of the *Rhus Toxicodendron* with impunity. (Alibert, *Matiere Medicale,* tom. i. p. 450. 3rd Edition.)

3rd. *M. Van-Mons,* who has made an interesting work on this plant, is of opinion, that its hurtful effects depend upon a gas, which it exhales during the night, in the shade, and in cloudy weather, rather than on its milky juice. This gas, according to him, is nothing else than carbonated hydrogen, holding in solution a carbonated deleterious miasma. Its effects

* *Traité sur le Venin de la Vipere,* by Felix Fontana, tom. ii. p. 160. Florence, 1781.

on the animal economy vary according to the disposition of persons, and the circumstances under which they are placed: such an one, for instance, cannot pass near a *Toxicodendron* without feeling effects more or less disagreeable; another, on the contrary, may handle it with impunity. M. San-Mons, after collecting a certain quantity of this gas under a cylinder, covered with a case of black paste-board, induced his brother, who was extremely sensible to the effects of the *Rhus*, to plunge his hand into it. At the moment of the emersion, he experienced burning smart, which was succeeded by inflammation, hardness and swelling of the part. The same experiment repeated with the gas collected at noon day, and in a vessel exposed to the sun, was without effect. (*Actes de la Société de Medecine de Bruxelles.*)

812. The different facts we have just reported tend to prove:

1st. That the most active part of the *Rhus Radicans* or *Toxicodendron*, is that which is disengaged in a state of gas; whilst it does not receive the direct rays of the sun.

2nd. That it acts like the acrid poisons.

3rd. That the watery extract internally administered, or applied to the cellular texture, produces a local irritation, followed by an inflammation more or less intense, and that it exerts a stupefying action on the nervous system, after being absorbed.

4th. That it appears to act in the same manner when injected into the jugular vein.

813. The *Rhus Vernix* produces effects similar to those we have just described.

OF THE *ANEMONE PULSATILLA (WIND FLOWER).*

814. This plant belongs to the family of the *Ranunculaceæ* of Jussieu, and to the Polyandria Polygynia of Lin.

Involucrum cauline, deeply cut into threads hairy or narrow, placed two centimetres below the flower; corolla of from five to nine petals, oblong, straight, raised, and somewhat more hairy: a great number of stamina shorter than the corolla: capsules numerous, collected into a head, surmounted by a feathery tail; stalk without leaves, two feet high, cylindrical, hairy, bearing on its top a tolerably large violet flower: radical leaves, elongated, bipinnated, hairy, and whitish when young, nearly smooth when more advanced, and having segments fine and pointed. It is found on hills, that are dry and open.

ACTION OF *ANEMONE PULSATILLA* ON THE ANIMAL ECONOMY.

Experiment 1st. At one o'clock, a wound was made on the inside of the thigh of a robust dog; two drachms and a half of a watery extract of Anemone Pulsatilla, were applied upon the cellular texture, and the lips were united by a few stitches. The next day, at eight in the morning, the animal had experienced nothing remarkable. In the evening he was weak, but little sensible, and kept himself lying on the side. He had however no vertigo, nor did he utter any complaint. He died the day after, at five in the morning. The mucous membrane of the stomach was generally red; it presented here and there spots of a very bright red; the rectum was somewhat inflamed; there was no sensible alteration in the lungs; the limb was very much inflamed.

Experiment 2nd. At eight in the morning, the experiment was repeated with a dog of middle size, and one drachm only of the extract was employed; six hours after, the animal did not appear indisposed. The next day, at nine in the morning, he drank a tolerably great quantity of water, which he threw up shortly after; he was dejected, but was able to walk about. At eleven, he was lying on the side, and motionless;

his inspirations were rare and deep. At one o'clock, he continued to make efforts to vomit; his posterior extremities were so weak, that he could not stand on his legs. He died at four o'clock. Not the least alteration could be discovered by dissection, in the digestive canal. The wound was very much inflamed.

Experiment 3rd. At eight in the morning, five ounces and a half of the juice of the fresh leaves of Anemone Pulsatilla, were introduced into the stomach of a dog of a large size: (this juice contained three ounces of water, which was of necessity employed in order to extract it) the œsophagus was then tied. At nine o'clock, the animal began to moan; he made some efforts to vomit, and passed a tolerably copious stool. An hour after, the efforts to vomit, and the moaning continued as before. At one o'clock, he had passed two more stools, and was in a deplorable condition; lying on the side, insensible, and almost without motion, he might be pinched, and shaken any way, without giving the least sign of sense; the organs of sight and hearing were no longer susceptible of impression; the limbs, which were in a state of great relaxation, were not affected with any convulsive movement: the breathing was accelerated, and performed in a very painful manner. It was in vain attempted to raise him up; he fell down every instant, like an inert mass. These symptoms increased in violence, and the animal died at two o'clock. He was opened immediately. The heart contracted for ten minutes; it was then cut into; the blood contained in the ventricles was blackish and fluid; the lungs presented a greater degree of density than natural; they were not very crepitating, and sunk a little in water, especially when the more dense portions were submitted to this experiment. The stomach was distended by a tolerably large quantity of aliments, and contained a viscid fluid of a greenish colour; its mucous membrane presented a cherry-red colour in the third part of it nearest the pylorus; throughout the rest of its extent it was

of a deeper red, and scattered over with projecting patches almost black, in which could be easily discovered extravasated venous blood; the subjacent muscular coat appeared but little altered; the rectum, which was inflamed, and covered over with red spots; contained greenish excrements; the rest of the intestinal canal was as in its natural state.

Experiment 4th. We have frequently administered to dogs from four to six drachms of the dried powder of Anemone Pulsatilla; these animals appeared to experience no inconvenience.

Observations.

1st. *Helwing* asserts, that the syrup of Anemone Pulsatilla has given rise to fatal accidents.

2nd. *Bulliard* reports, that an old man affected for some time with rheumatic gout, applied to the calf of the leg the root of this plant bruised between two stones; and after drinking a bottle of wine, went to bed. He fell a prey to the most cruel sufferings, for ten or twelve hours, and the whole limb was gangrened. Scarifications were made in it, and compresses of camphorated spirit were applied; by these means the progress of the mischief was arrested, and the patient was entirely cured of this rheumatic affection. *(Histoire des Plantes Vénéneuses de la France, p.* 79.*)*

3rd. M. *P*—— apothecary, experienced a violent itching of the eyes, gripes, and vomiting, in consequence of pounding some dried Anemone Pulsatilla; these symptoms were all removed by diluent medicines.

815. We are of opinion, that it may be inferred from the preceding statements:

1st. That the Anemone Pulsatilla produces violent inflammation of the parts with which it comes in contact.

3nd. That it is absorbed, and carried into the circulation.

3rd. That it appears to act by stupefying the nervous system.

4th. That it likewise probably exerts an irritating action on the lungs and stomach.

5th. That its deleterious properties reside in every part of the fresh plant.

6th. Lastly, that its effects are much less, and become null on its being dried.

Many other species of this kind are poisonous.

1st. *Vicat*, has seen the extract of *Anemone Pratensis*, produce, in the dose of two drachms, gnawings in the stomach. *Bergius* reports, in his Materia Medica, p. 490, that the eye-lids of a child became red and tumefied, accompanied with dimness of sight, in consequence of having been exposed to the vapour arising during the evaporation of the juice of this plant, for the purpose of forming an extract.

2nd. The decoction of *Anemone Sylvestris*, according to *Bulliard*, has produced horrible convulsions, which placed the patient in a state of the greatest danger, and which only yielded to a strong solution of honey.

3rd. Such animals as browse on the young shoots of the *Anemone Nemorosa* (of the woods) experience weakness of the legs, trembling, and bloody stools, and die in the course of a few days. The inhabitants of Kamtschatka make use of this plant to poison their arrows, and the wounds are most commonly fatal.

4th. It is probable that the *Anemones Palmata, Narcissiflora*, and *Ranunculoides*, are equally poisonous.

OF ACONITE.

816. *Characters of the genus.* The Aconite, as ranged by Linnæus in the Polyandria Polygynia, and by Jussieu, in the *Ranunculaceæ*, presents a calyx with five leaflets, the superior one of which is concave, in the form of a casque; the petals are numerous, very small, in form of scales: the two superior ones, called *Nectaries* by Linnæus, are elongated, con-

cealed under the casque, furnished with a long claw, elbowed at the extremity, in such a manner that their border is reflected back, in the shape of a lip, and their extremity is thick, obtuse, in form of a crozier: the capsules are most commonly to the number of three, oblong, straight, pointed.

Aconitum Napellus. Stem straight, simple, firm, leafy, six decimetres in height, terminating in a spike, somewhat dense, the flowers of which are of a violet blue, tolerably large, close together, single upon their peduncle: leaves petiolated, palmated, multifid, with linear segments of a dark green, shining: little foot-stalks pubescent: the casque of the flowers is convex, and of a length double its height: the two petals concealed under the casque, have the top obtuse, tending very slightly to curl outwards. It grows in sheltered and moist places in the mountains. All the parts of the Aconite in the fresh state, when chewed, produce a sense of heat and pain in the mouth and throat.

ACTION OF *ACONITUM NAPELLUS* ON THE ANIMAL ECONOMY.

Experiment 1st. At noon, a small robust dog was made to swallow two drachms of the watery extract of Aconite bought at an apothecary's; a quarter of an hour after, the animal was somewhat drowsy, shut his eyes, hung down his head, then on a sudden raising it again, performing a motion similar to that of persons who awake after having fallen asleep standing, or in a chair. During this shock he was threatened with a fall upon his breech; the pulsations of the heart were regular, and somewhat accelerated. The next day, he experienced some vertigoes. He died the day following. The brain presented no alteration; the lungs, which were dense, and of a brownish colour, were distended with blood, and less crepitating than natural, the digestive canal was sound.

Experiment 2nd. Half an ounce of watery extract of

Aconite bought from another apothecary, and dissolved in an ounce of water, was introduced into the stomach of a small dog, and the œsophagus was tied. Four days after, the animal did not yet appear to be under the influence of the poison. He died on the sixth day, without having shewn any other symptom than the dejection inseparable from the operation. The opening of the body shewed no alteration of the internal organs.

Experiment 3rd. A drachm of the same extract was applied to the cellular texture of the back of a tolerably strong little dog. The next day, the animal was drowsy, walked about very well, but appeared very little disposed to motion. The pulsations of the heart were accelerated; he refused his food; he had neither vertigo nor convulsions. On the night of the following day, he died. The lungs were somewhat distended with blood, and less crepitating than usual; the brain and stomach shewed no alteration.

Experiment 4th. At twelve at noon, the same experiment was repeated with two drachms of the same poison, which was applied upon the cellular texture of the inside of the thigh of a small dog. Half an hour after, the animal had experienced no remarkable symptom; he was in the same condition at six in the evening. The next day, at one o'clock, he was in a state of great insensibility: he was lying on the side, and might be moved in any way like an inert mass; he could no longer stand; his fore legs were a little separated, and the animal stretched them out from time to time, as if he wished to stiffen them; but this motion was slow and feeble; the pupils were but little dilated; the organs of sense possessed almost all their faculties, and the animal uttered no cry; respiration and the circulation were performed slowly. He died in the night. He was opened on the following day. The limb operated on was livid on the exterior; on cutting into the skin, a very extensive inflammation was perceived, and a serous sanguineous infiltration; there were also several spots

formed by black extravasated blood. The stomach was sound; the rectum exhibited a few reddish spots; there was no alteration in the rest of the intestinal canal; the lungs were of a tolerably deep red colour, they contained a little black blood, and were sufficiently crepitating.

Experiment 5th. Thirty-six grains of the same extract dissolved in half an ounce of water, were injected into the jugular vein of a small dog. The animal instantly made water; he had some slight vertigoes, and made some fruitless efforts to vomit; the vertigoes went on increasing, to such a degree that, five minutes after the injection, he fell on his posterior extremities, which were weaker than the anterior. He was again raised up; and was drowsy, bending from time to time his hind legs. Six minutes after, he had a stool; the next day, he took food, and did not appear very ill. The day after, the vertigoes appeared afresh; he lay down on his side, was very little sensible, and died at the expiration of twenty-six hours. No remarkable lesion was discovered after death.

Experiment 6th. Thirty-six grains of the same extract dissolved in two drachms of water, were injected into the jugular vein of a small robust dog. The animal instantly began to howl; a short time after, he was excessively drowsy, and the organs of sense became insensible; he had no convulsions. Four minutes after, he made one last effort to breathe, and expired. He was opened the same moment. The heart was contracting with sufficient force; the blood contained in the left ventricle was fluid, and of a bright red; that contained in the right ventricle was coagulated and blackish. The lungs were rose-coloured, and crepitating.

Experiment 7th. One drachm and six grains of the resinous extract of Aconite, were applied on the cellular texture of the back of a small dog. At the end of five minutes, the animal was drowsy; a quarter of an hour after, he staggered;

the next day he was dejected, and refused food. He died on the sixth day. The internal organs did not appear altered.

817. These experiments were made with the extract of Aconite sold in the shops, and which is mostly prepared by making a very strong decoction of the plant, and evaporating the product at a temperature somewhat elevated. It was easy to foresee, that the extract so prepared would not be so active as that which should be obtained by expressing the juice of the fresh plant, and evaporating it in a water-bath. In fact, there exists a certain number of vegetable substances which become volatile at the temperature of boiling water; others are decomposed; and it is not to be doubted, that the black colour of the greater part of the extracts found in commerce, depends on the decomposition of one or several, of the principles which formed part of the vegetable. These considerations induced us to undertake fresh experiments with the intention of comparing the deleterious properties of these two kinds of extract of Aconite. We have extended these researches to the principal preparations of this kind used in medicine, and we are able to affirm, 1*st*. *That certain extracts prepared by expressing the juice of fresh plants, and evaporating them in a water-bath, are incomparably more active than those obtained by any other process.* 2*nd*. *That they are of a yellowish colour, which forms a singular contrast with the black colour of those found in commerce, which without doubt depends on the decomposition which these undergo by caloric.* 3*rd*. *That the extracts of those plants sold in the shops, differ greatly amongst themselves in regard to their action on the animal economy; that a great proportion of them possess no virtue: which circumstance, we are of opinion, ought to attract the attention of those Professors, whose duty it is to visit the shops.*

The correctness of these conclusions will be easily perceived on an attentive comparison of the preceding experi-

ments, with those which we are about to describe, which have been made with the extract of Aconite, prepared with the greatest attention.*

Experiment 9th. At eight in the morning, a drachm and half of the watery extract of Aconite, was applied to the cellular texture of the thigh of a small, but extremely robust dog. At a quarter past eight, the animal was agitated, he ran rapidly over the laboratory, and uttered plaintive cries. At thirty-five minutes past eight, he staggered; he laboured under very severe vertigoes, and preserved the power of seeing and hearing; the agitation went on increasing. A few moments afterwards, he lay down upon some straw, which he stirred up from time to time, for the purpose of forming a bed for himself. At a quarter past nine, he vomited a tolerable quantity of alimentary matter; the other symptoms had acquired a greater degree of violence. At half past nine, fresh vomiting; the animal, that had just been raised up, fell down upon the side, in a state of considerable stiffness, and pushed out his posterior extremities with some violence. Two minutes after, he recovered himself again, made a few steps with staggering, and uttered plaintive cries; his appearance denoted suffering. He died at three quarters after ten, and shewed no sign of paralysis in his posterior extremities.

Dissection took place at a quarter past eleven. The limb operated on was scarcely inflamed; the digestive canal presented no alteration; the heart was flabby, and contained black thick blood; the lungs were of a rose colour, bordering on deep red, and crepitating.

Experiment 10th. At a quarter before nine, two drachms ten grains of the same extract, were introduced into the stomach of a small dog tolerably strong, dissolved in an ounce of water; and the œsophagus was tied. Twenty

* M. Richard, private teacher of Chemistry, and apothecary to the Hospital of the *Charité*, undertook to furnish us with the extracts such as we have described: we wish to testify towards him all our gratitude.

minutes after, the animal made efforts to vomit; his posterior extremities began to grow weak, and he was in a remarkable state of agitation; he preserved the free use of his senses and movements; he nevertheless staggered. At twenty minutes after nine, he was lying on the side, moaning, and exhibiting convulsive motions in the head; he was put on his feet, with the design of making him walk: he made a few steps staggering, and lay down again; his posterior extremities were entirely paralyzed, and he appeared to be in great pain. At three quarters after nine, the agitation was extreme: the animal uttered piercing cries, walked from right to left, dragging the hind feet after him, and after having crossed the laboratory in different directions, fell down again; the convulsive contractions of the muscles of the head, communicated to this part quick motions, which might be compared to the shocks occasioned by the electric fluid accumulated in frogs: the organs of hearing and vision appeared to exercise their functions freely. These symptoms acquired a fresh degree of violence, and the animal died a quarter before eleven. He was opened half an hour after. The mucous membranes of the stomach and duodenum were slightly inflamed; the rectum presented no alteration; the lungs were crepitating; the ventricles of the heart contained a very great quantity of blood, which was coagulated, and extremely black.

Experiment 11th. *Wepfer* gave to a wolf, two pieces of meat containing about two drachms of the root of *Aconitum Napellus*. Eight minutes had scarcely elapsed, when the animal vomited one of the pieces, together with viscid and frothy mucosities; he felt pain in the belly, and vomited again. Perceiving a short time after, that he was in very good health, two drachms of the same root divided were given to him in some whey: he soon vomited several times, and frequently contracted the abdomen. Half an hour after, he agitated his fore paws with some violence, dug a bed for himself in the ground, and lay down on the side. He was made to get up and walk

about, and he began again to dig: he experienced a general trembling, but neither vertigo nor convulsions. He lay down again on the side, and made efforts to vomit; his mouth was filled with foam. The abdomen was cut open, and he expired two hours after the ingestion of the first bolus, without shewing the least signs of pain. The stomach contracted; the intestines, which were animated by their peristaltic motion, contracted also, without the excretion of any excrementitious matter; the interior of the digestive canal was inflamed in several points; several living worms were perceived in it; the right auricle and ventricle contained a small quantity of frothy blood, and a considerable quantity of clots; the left ventricle contained only one of these clots in its superior part. (*Op. citat.* p. 178).

Experiment 12th. *Bonetus* administered to a dog three weeks old, half a drachm of the fresh root of *Aconitum Napellus* well divided; the animal died two hours afterwards. The symptoms which he experienced were vomitings, convulsive movements of the whole body, and weakness in the posterior extremities; the stomach was not inflamed; the blood was fluid, and the bladder contained a great quantity of urine. (*Sepulchretum Boneti*, p. 493. tom. iii. *Lugduni*, 1700.)

Experiment 13th. At eight in the morning, five drachms of the fresh root of *Aconitum Napellus* bruised, were introduced into the stomach of a strong dog of middle size, and the œsophagus was tied. Five minutes after, the animal began to make violent efforts to vomit; he moaned; ran rapidly over the laboratory with a wild air, and was evidently much agitated. At eleven minutes after eight, he experienced slight vertigoes, and had scarcely ceased for a moment to moan, and to make efforts to vomit; he uttered loud cries, and began to be no longer able to support himself on his hind legs. Three minutes after, he fell down while attempting to walk; he was raised up, but soon fell again; the pulsations

of the heart were unequal, sometimes strong, at others weak; the pupils were dilated; there was no convulsive movement; and the animal preserved the free use of his senses. At seventeen minutes after six, the pulse beat a hundred and fifty strokes in the minute; it was regular and strong, the animal was motionless, and nearly insensible. At twenty-one minutes after eight, he all at once bent back his head upon the back, and his legs became stiff and separated: this state continued two minutes; he then expired. He was immediately opened. The heart no longer contracted, even after the irritation occasioned by opening the pericardium; it was very much distended, and contained blood of a vermillion colour and fluid, in the aortic cavities. The right ventricle was filled with black blood, likewise fluid; the lungs appeared sound; the stomach contained almost the whole of the root ingested; its interior coat was scarcely red.

Experiment 14th. At seven in the morning, two ounces of the juice of the fresh leaves of *Aconitum Napellus*, to which had been added an equal quantity of water, were introduced into the stomach of a robust dog of middle size: the œsophagus was then tied. A short time after, the animal appeared agitated; at ten o'clock, he experienced no other sensible phenomenon. At seven in the evening, he had frequently made efforts to vomit; was somewhat drowsy, and the posterior extremities began to grow feeble; he preserved however the use of his senses, and the free faculty of motion; his breathing was deep. The next morning at six o'clock, he was found dead. The stomach was filled with a blackish fluid, of a bilious appearance; there was no vestige of inflammation in the digestive canal; the heart was filled with black coagulated blood; the lungs, not very crepitating, presented several livid patches, dense, and distended with blood.

Experiment 15th. M. Brodie injected into the rectum of a cat, an ounce of juice of Aconite leaves. Three minutes afterwards, the animal rejected almost the whole of the fluid,

and remained quiet for six minutes; he then vomited, and attempted to walk; but staggered as if drunk. Thirteen minutes after the injection, he was lying upon the side, motionless, except that he shewed from time to time some slight convulsive motions of the limbs. Respiration became slow and painful, and he appeared to be dead forty-seven minutes after the experiment. A few moments before he expired, the heart beat a hundred regular pulsations a minute.

Experiment 16th. The same physiologist applied upon the cellular texture of the side of a young rabbit, about twenty drops of the juice of Aconite leaves. At the end of twenty-three minutes the same symptoms took place, and the animal died forty-seven minutes after the application of the deleterious substance. (*Philosophical Transactions, anno* 1811, p. 1, page 185 and 193.)

If, says M. Brodie, the leaves of Aconite be chewed in small quantity, a sensation of numbness is felt in the lips and gums, which does not subside till after two or three hours.

Observations.

1st. *John Crumpler*, at eight in the evening, ate some salad, in which had been put, by mistake, a certain quantity of *Aconitum Napellus*. He felt immediately a burning heat on the tongue and gums, and a great irritation in the cheeks. He thought that the blood no longer circulated in his limbs; he had however no inclination to vomit. Perceiving the symptoms to go on increasing, he drank about a pint of oil, and a great quantity of tea, which made him vomit. The symptoms, far from disappearing, were aggravated. At ten o'clock, *Vincent Bacon*, an English surgeon, was called in, and found the patient in bed, his eyes and teeth fixed, the hands and feet cold, the body for the most part covered with a cold sweat, pulse scarcely perceptible, and the breathing so short, that it could with difficulty be perceived. He made

him swallow two spoonfuls of spirit of hartshorn, which occasioned coughing and vomiting: he then administered to him the infusion of *Carduus Benedictus*, until several vomitings were procured. The patient shortly after had a stool, and vomited afresh. The pulse became a little raised, but was intermitting, and extremely irregular. A draught was given of *Aq. epidem. Ther. Androm. Conf. Alkerm*, with a few drops of *Sal Volatile* and *Tinct. Croci*. The next morning, he was a great deal better, and the cure was soon completed.*

2nd. The root of *Aconitum Napellus* was administered to four highwaymen. Two of them, after having experienced the most violent pains, were saved by appropriate means; the other two died, one of which, a few hours after the administration of this root, became an idiot; the face was covered with a cold sweat; asphyxia, spasms, and syncope took place; he passed involuntary stools; vomited bilious and livid matter; his body swelled, and he died apoplectic.†

3rd. *Willis* relates that a man died mad, and in a very short time, in consequence of having eaten a salad, in which there were some of the fresh leaves of *Aconitum Napellus*. (*De Animâ Brutorum*, p. 289.)

4th. The juice of Aconite, introduced into a small wound made in the thumb, has been known to give rise to pains in the fingers and arm, cardialgia, anxiety, with fear of suffocation, lipothymia, agitation, and finally gangrene and copious suppuration.‡

818. It results from the facts just related,

1st. That the juice of the leaves of Aconite, introduced into the stomach or rectum, or injected into the cellular texture

* *Philosophical Transactions*, vol. xxxviii, p. 287, anno 1734, obs. iii.

† *Mathiolus in Dioscorid. ed. C. Bauch*, p. 768, tom. ii. p. 1.

‡ *Alberti Jurisprudentia Medica*, tom. vi. p. 724. *Obs. de Rodder.*

of dogs, produces serious accidents, followed by a speedy death;

2nd. That the same happens from the root of this plant, the effects of which appear still more decided than of the leaves;

3rd. That the watery extract of Aconite prepared by expressing the juice of the fresh plant, possesses nearly the same poisonous properties as the juice, whilst at the same time it is incomparably less active when it has been obtained by decoction.

4th. That the resinous extract is more energetic than the watery one.

5th. That these different preparations are absorbed, and carried into the circulation; that they act particularly on the nervous system, and more especially on the brain, where they produce a kind of mental derangement.

6th. That they exert besides a local irritation capable of producing inflammation more or less violent.

7th. That they appear to act on the human species as on dogs.

The *Aconitum Cammarum*, Monk's Hood, is possessed of a flavour more acrid than the preceding, and of extremely energetic properties.

1st. *Mathiolus* relates, that a criminal condemned to death, ate some of the root of this plant. He perceived a tolerably strong flavour of pepper, and at the end of two hours was seized with vertigoes, and commotions of the brain so violent, that he thought his head full of boiling water; a general swelling of the whole body took place; the countenance livid; the eyes were out of their sockets; in fine, the unfortunate man died in most horrible convulsions.

2nd. We find in the *Sepulchretum* of Bonetus, and in the *Memoires de l'Académie de Suède*, facts similar to the preceding. Formerly arrows were poisoned with the juice of this plant.

The *Aconitum Anthora* appears also to be poisonous. *Hoff*

man says, that it overturns the stomach, and occasions a burning heat accompanied with thirst and anguish about the heart. *Solier*, *Lobel*, and *Prevot*, have seen this root produce vomitings and stools. How then could it happen that the ancient Authors have announced this root as the antidote of the other species of Aconite.

Aconitum Lycoctonum (Wolf's Bane). The root of this plant mixed with salad occasioned considerable uneasiness to several guests who partook of it. Others have felt vertigoes, heat, and swelling of the tongue, in consequence of having chewed the flowers of this species of Aconite. (*Bauhinus*, l. c. p. 653.)

OF CELANDINE.

819. The Celandine (*Chelidonium Majus*) belongs to the Polyandria Monogynia of L. and to the family of the *Papaveraceæ* of Jussieu.

Characters. Calyx caducous, composed of two oval leaflets, concave: corolla, of four petals, nearly round, open, and of a yellow gilt: the stamina are numerous, with threads distinct from one another, and equal in length. The fruit is a cylindrical pod, simple, bilocular, knotty, containing several seeds. Its stalks are cylindrical, branching, and slightly hairy; its leaves are winged, large, soft, incised, of a tender green colour above, and of a sea-green below; from the axilla of these leaves proceed peduncles naked, and in umbel, which bear four, five, or as many as nine flowers, each of which has its peduncle and stipula. The root is of a reddish brown when fresh, and black when dried. Whatever be the part of the Celandine in which an incision is made, there flows out a yellowish juice, which is bitter, caustic, of a disagreeable smell, and which is employed for the purpose of destroying warts and corns. It grows every where, in hedges, chinks of old walls and ruins, especially in the shade.

ACTION OF CELANDINE UPON THE ANIMAL ECONOMY.

Experiment 1st. Three drachms of the watery extract of Celandine, were introduced into the stomach of a small feeble dog, and the œsophagus was tied. At the end of six minutes the animal made violent efforts to vomit: four hours after, he was lying on the side; he made deep inspirations; sensibility and mobility were diminished to such a degree, that the organs of hearing and vision were no longer capable of receiving impressions; and he was not able to stand. He died a very short time after. The stomach contained a small quantity of a fluid excessively viscid, and of a brownish colour; the mucous membrane was of a bright red throughout its whole extent, and of a blackish red in its folds; the intestinal canal was not altered; the lungs were of a reddish colour, crepitating, and appeared not to be affected.

Experiment 2nd. At three o'clock, an incision was made in the inside of the thigh of a small dog, and a drachm and half of watery extract of Celandine dissolved in a small quantity of water, was applied to the wound. At five, the animal experienced nothing remarkable. The next day, at nine in the morning, he was found dead. The digestive canal exhibited no sensible lesion; the wound was inflamed, and the lungs somewhat livid.

Experiment 3rd. At seven in the morning, the above experiment was repeated upon a dog of middle size, with two drachms of the same extract. At four o'clock, the animal had experienced nothing remarkable. At ten in the evening, he was hardly sensible, was lying down on the side, and could no longer perform any motion. He died in the night. The digestive canal presented no alteration; the lungs were livid, distended with blood, and but little crepitating; the limb operated on was tumefied, infiltrated, and very much inflamed.

Experiment 4th. Four ounces of the juice of Celandine prepared with the leaves, were introduced into the stomach of a dog of middle size; the œsophagus was tied. The animal made efforts to vomit, moaned, and became insensible. He died ten hours after. The mucous membrane of the stomach was inflamed; the lungs presented here and there livid patches somewhat distended with blood.

820. From the preceding facts it results,

1st. That Celandine and its extract produce serious symptoms, followed by death.

2nd. That their deleterious effects seem to depend on the local irritation they excite, as much as on their absorption and action on the nervous system.

3rd. That it appears to act also on the lungs.

OF STAVESACRE.

821. Stavesacre *(Delphinium Staphysagria)* belongs to the Polyandria Trigynia of L. and to the family of the *Ranunculaceæ* of Jussieu.

Seeds triangular, and even quadrangular, curved, shagreened, of a brownish colour; shell brittle, thin, of an acrid bitter taste; almond white, insipid; albumen horny; embryon straight, superior, radicle inferior.

ACTION OF STAVESACRE ON THE ANIMAL ECONOMY.

Experiment 1st. An ounce of Stavesacre reduced to a fine powder, was introduced into the stomach of a small robust dog, and the œsophagus was tied. Two days after, the animal was dejected, but had experienced neither vertigo or convulsions. He died fifty-four hours after the operation. The mucous membrane of the stomach presented a crimson red colour in the third part of its extent next the pylorus, the

other parts were somewhat less red; there was no sensible alteration in the other organs.

Another animal submitted to the same experiment furnished similar results, except that he died at the expiration of fourteen hours.

Hillefeld made dogs swallow the infusion of Stavesacre; these animals died, after having had vomitings, involuntary stools, general trembling, and great debility.

Experiment 2nd. A wound made in the inner part of the thigh of a dog, was sprinkled with two drachms of this same powder, and the lips were united by suture. The animal had not shewn any remarkable symptom seventy-two hours after the operation. He died in the night of the third day. The lungs and digestive canal were sound; the limb operated on contained on the surface of the wound, a tolerable quantity of the powder employed; it appeared of a greenish colour; the inflammation, which was not very violent, had terminated in suppuration.

Experiment 3rd. The same experiment was repeated at seven in the evening, with two drachms of Stavesacre slightly *moistened.* The next day, the animal was somewhat dejected. The day after, at six in the morning, he experienced such vertigoes that he could not walk without falling; he uttered no plaintive cry, and preserved the free use of his senses. He died at noon. The digestive canal presented no alteration; the lungs were reddish, and more dense than natural; the limb operated on was swelled, infiltrated, and very much inflamed; the inflammation extended up to the fourth sternal rib. There was no slough.

822. These facts induce us to believe,

1st. That Stavesacre is not absorbed, and that its deleterious properties depend on the local irritation it produces, and the sympathetic lesion of the nervous system;

2nd. That the part soluble in water is the most active: so likewise the local effects of its administration are more severe

when it is moistened before being applied to the cellular texture.*

OF THE MEADOW NARCISSUS.

823. The Meadow Narcissus *(Narcissus Pseudonarcissus)* belongs to the Hexandria Monogynia of L. and to the family of the *Narcissi* of Jussieu.

Characters. Calyx coloured of a pale yellow, of six equal pieces, which many botanists call a corolla: nectary campanulated, of a deeper yellow, of the length of the petals, folded in the upper part, indented, divided into six parts to the top, and containing six stamina: stalk *(scapus)* compressed, of eight or ten inches high, surrounding always the base of the flower, which is large, terminal, and bent downward: leaves to the number of two or three, plain, obtuse, not so long as the stalk, inclining to a sea-green. This plant is found in woods and meadows.

ACTION OF THE MEADOW NARCISSUS UPON THE ANIMAL ECONOMY.

Experiment 1st. At half past nine, there were introduced into the stomach of a young dog of middle size, four drachms of a watery extract of Meadow Narcissus, and the œsophagus was tied. At the end of an hour, the animal made efforts to

* We often omit noticing the state of the brain in those animals that died after having taken any kind of poisonous substance; we have nevertheless examined this organ in almost all the dissections we have made; but it has rarely exhibited any notable lesions. How often have we seen animals die in consequence of a direct lesion of the nervous system, without being able to discover, after death, the slightest change in the colour, structure, and consistence of the contents of the head. This fact, which is moreover agreeable with what is observed in a multitude of patients who die of nervous affections, renders it unnecessary for us to speak of that organ, at least unless it should be the seat of some evident lesion.

vomit. At noon, he had one stool, which contained a tolerable quantity of solid matter. Forty minutes after, he made fresh attempts to vomit. At eight in the evening, he was somewhat agitated, uttered plaintive cries, and experienced some slight giddiness; his breathing was not at all impeded. He died in the night. The left lobe of the lungs presented, near its inferior edge, a violet-coloured spot, containing venous blood, and as broad as a crown-piece; the remaining portion of this viscus was sound.* The stomach contained a small quantity of a mucous brownish fluid, which could easily be detached; the mucous membrane presented several irregular spots, tolerably extensive, of a cherry-red colour, without any apparent ulceration; the duodenum was somewhat inflamed; the mucous membrane lining the inferior part of the rectum was rather red; the ventricles of the brain contained no serosity; the veins creeping over the external surface of this organ were distended with black blood.

Experiment 2nd. At two o'clock, a drachm of a watery extract of Meadow Narcissus, was applied to a wound inflicted in the inside of the thigh of a small dog. The animal died in the night, without any person being able to observe him. The mucous membrane of the stomach was filled with small spots of a cherry-red colour: the wound was not very much inflamed; the other organs presented no remarkable alteration.

Experiment 3rd. At nine in the morning, a wound was made in the inside of the thigh of a small dog, and a drachm and half of the same extract was applied; the lips were afterwards united by suture. At four o'clock the animal had not experienced any remarkable symptom. He died in the night. The lungs contained a little black blood; the mucous

* These spots ought to be considered as ecchymoses produced in the pulmonary organ, in consequence of a violent effort, which may have occasioned the rupture of some small vessels.

membrane of the stomach and that of the rectum, exhibited rings of a bright red colour: the limb, which was very little inflamed, was nevertheless the seat of a sanguineous infiltration sufficiently marked.

Experiment 4th. At eleven at night the same experiment was repeated, with forty-eight grains of the same poison, upon a robust dog of middle size. The animal vomited at the expiration of three quarters of an hour. Two days after, he was in good health, and made his escape.

Experiment 5th. Wishing to know what were the symptoms produced by the extract of Meadow Narcissus, when applied externally, the experiment was begun again at midnight upon a powerful dog, and a drachm of the extract was employed. The animal vomited six times during the night; he uttered some plaintive cries. At five in the morning, he was lying down on the side, in a state of great insensibility; his limbs, which were flabby, were not affected by any convulsive movement; the breathing was deep, and somewhat impeded. He died an hour after. The wound was very little inflamed; the mucous membrane of the stomach presented some reddish streaks; the intestinal canal was not the seat of any alteration; the lungs were grayish on the outside, reddish within, and contained a serous fluid in tolerable abundance; the heart was filled with coagulated blood.

824. It results from the foregoing experiments,

1st. That the extract of Meadow Narcissus produces a local irritation not very intense;

2nd. That it is quickly absorbed, and produces severe symptoms, followed by a speedy death;

3rd. That it is emetic.

4th. That it appears to act on the nervous system by destroying sensibility, and on the mucous membrane of the stomach; that its action is more energetic when applied to the cellular texture.

OF THE *ÆNANTHE CROCATA.*

825. This plant belongs to the *Umbelliferæ* of Jussieu, and the Pentandria Digynia of Lin.

Characters. Umbel large, having sometimes twenty-five, or thirty rays expanding, long; umbellula, with flowers nearly sessile; involucrum of five or six leaflets, somewhat elongated; involucellum of from six to eight white flowers; calyx of five fine teeth, persisting; corolla of five petals, curved in shape of a heart, larger at the edge of the circumference, (radiated). Fruit oblong, striated, surmounted by the teeth of the calyx and the styles: roots consisting of sessile tuberosities: stalk two feet high, thick, striated, erect, branchy, smooth, of a dirty green colour, full of a yellow juice: leaves bipinnated, with leaflets wedge-shaped, incised, trifid, smooth, similar to those of Parsley. This plant is found in ditches and fens.

Observations.

1st. On the 10th of April, 1677, a townsman of the Hague ate, with one of his friends, some roots of the Ænanthe. In a short time they both felt a great heat in the throat and stomach, which was followed by alienation of mind, vertigo, cardialgia, nausea, and diarrhœa. One of them had violent convulsions, the other bled at the nose; the one who had eaten the most, died at the end of two hours, the other at the end of three.*

2nd. Three French prisoners taking a walk in the neighbourhood of Pembroke, gathered and ate by mistake a small quantity of Ænanthe with some bread and butter. One of them in a short time experienced violent convulsions; he was bled, and died soon afterwards. The two others took their dinners, and were soon after attacked with convulsions; one

* Vanderwiel, *Observationum pariorum, &c.* tom. i. p. 182, *Leidæ*, 1727.

died, the other was cured by bleeding and a vomit, which he had great difficulty in swallowing. Several of their companions who had also eaten of this plant were vomited, and recovered: none of them experienced any comatose symptom.*

3rd. *Watson* relates, that a man swallowed by mistake a spoonful of the juice of *Ænanthe Crocata*, prepared from one single root. About an hour and half after, he experienced convulsions, and such a spasm of the jaw, that it was impossible to separate the inferior maxillary bone from the superior. He died three hours and a half from the ingestion of the poisonous substance. (*Philosophical Transactions, a further account*, p. 856, anno 1758.)

4th. *Allen*, in a work entitled *Synopsis Medicinæ*, makes mention of the poisoning of four persons by this plant.

5th. *M. Charles*, was called in to attend a whole family that had eaten some roots of Ænanthe. Momentary sensations of an acrid heat, determining to the head, a pungent burning in the epigastric region, and small rose-coloured spots, of an irregular shape, extending successively; such were the symptoms produced by the poison. These spots, which did not exceed the level of the skin, made their appearance at first on the face, then on the breast, and on the arms; the father alone had the belly swelled out like a balloon. Mucilaginous and oily medicines with milk, were administered to them.†

6th. The 15th Messidor, year 10, there were brought to the principal Naval Hospital at Brest, the dead bodies of three soldiers of the 82nd Demi-brigade. These unfortunate Belgians, deceived by the resemblance which the root of *Ænanthe Crocata* bore to one made use of in their own country, ate a great quantity of it. Its sweetish flavour pleased their palates, and contributed to the keeping up of

* *Philosophical Transactions, London*, anno 1746, p. 227, Extract of Mr. Howel's letter.

† *Annales Chimiques de Montpellier*, No. 134.

their error. They very soon experienced a general uneasiness, nauseas, vertigoes, and vomitings. To these succeeded most violent convulsions, and with such rapidity, that they sunk under them in less than an hour, and before any assistance was given.

Dissection. Nothing remarkable on the exterior surface of the body. One of these bodies was preserved for four days, and, at the end of that time, no sign of putrefaction was observed: the brain and its membranes were sound, the lungs distended, their vessels full of black and dissolved blood. In the bronchia, trachea, and mouth, was found a frothy and whitish fluid. The lungs in one of these bodies presented on their external surface some petechiæ; the cavities of the two circulatory systems empty; the heart sound. The stomach contracted, and inflamed in its extremity and its lesser curvature; its coats thickened: the intestines puffed up, and their vessels injected; the venous and arterial systems distended with a fluid of the same nature, dissolved and blackish: the derangements were precisely the same in all the three.*

It is perfectly ascertained, that the plant of which we have just given the history, is the *Ænanthe Cicutæ Facie* of *Lobelius (vide Lobelii Adversaria,* published in 1572); and *Wepfer* is mistaken in confounding it with hemlock, as he has done in his work, p. 15. *Historia Cicutæ Aquaticæ.*

826. These observations prove, that the *Ænanthe Crocata* exerts an energetic local irritation, and that it acts powerfully on the nervous system.

Vacher relates, that seventeen soldiers ate of the root of *Ænanthe Fistulosa.* Three of them died; the rest were saved by vomiting. (*Act. Helvet.* vol iv.)

We read in the *Journal de Médecine,* tom. x. year 1758, that six and thirty soldiers were poisoned by this root. One died; the rest were restored by vomits.

* Duval *Dissertation Inaugurale, supra citat.* tom. i. p. 23.

OF THE *GRATIOLA* (HEDGE HYSSOP).

827. The Hedge-Hyssop *(Gratiola Officinalis)* belongs to the family of the *Scrophulariæ*,* and to the Diandria Monogynia.

Characters. Calyx of five equal divisions, furnished with two bracteæ at its base: corolla monopetalous, tubular, of a yellowish white colour, irregular, having the border divided into four segments; the superior ones emarginate, the three others even: two fertile stamina, two barren filaments, and the rudiment of a fifth, at the bottom of the corolla: superior germen, conical, bearing an awl-shaped style with a stigma of two divisions. The fruit is an ovoid capsule, pointed, bilocular, bivalve, containing small and numerous seeds: stalk three decimetres in height, straight, cylindrical, furnished with leaves throughout its whole length, and mostly simple: leaves opposite, sessile, oval, lanceolated, indented towards their summit; smooth, shining, and marked by three longitudinal ridges: flowers axillary, single, pedunculated. It is found in fens, by the sides of ponds, and in the moist parts of woods.

ACTION OF HEDGE-HYSSOP ON THE ANIMAL ECONOMY.

Experiment 1st. At a quarter past ten, three drachms and a half of watery extract of Hedge-Hyssop, were introduced into the stomach of a small strong dog, and the œsophagus was tied. At eight in the evening, the animal had not exhibited any remarkable phenomenon. The next day, at ten in the morning, he uttered plaintive cries: he was lying down on the side, and expired an hour after: his breathing had not been impeded. The mucous membrane of the stomach ex-

* Natural Order, *Personatæ*.—TRANSLATOR.

hibited, throughout its whole extent, a cherry-red colour: it was black wherever it forms the folds observed in the interior of this viscus; it was easy to be assured that this last alteration was the consequence of a certain quantity of black extravasated blood within the space which separates it from the subjacent muscular coat. This last was nearly in its natural state; the interior of the rectum was evidently inflamed: all the remaining portion of the alimentary canal was a little red. The lungs did not appear affected; there was no serosity in the ventricles of the brain: the exterior cerebral veins were distended with black blood. The pia mater was injected, and of a vermillion red colour.

Experiment 2nd. This experiment was repeated with three drachms of the same poisonous substance. The animal died twelve hours after, in the night. The mucous membrane of the stomach was of a bright red throughout its whole extent; the intestines and lungs did not appear to be injured.

Experiment 3rd. An incision was made at noon, in the inside of the thigh of a dog of middle size; three drachms of a watery extract of Hedge-Hyssop, were applied to the wound, and the lips were united by suture. Half an hour afterwards, the animal had suffered nothing; he was just the same at six in the evening. The next day, at one o'clock, he was found dead. The body was still warm, the wound was pretty much inflamed; the limb operated on exhibited throughout its whole extent, a serous bloody infiltration. The stomach was only very slightly red, and contained food. There was no alteration in the intestinal canal: the lungs appeared sound.

Experiment 4th. The same experiment was repeated at half past ten in the evening. The next morning, at six o'clock, the animal appeared not yet to feel any inconvenience. At ten, he vomited, and attempted to bite when he was shaken. At one he was lying upon the side, in a slight degree of dejection. When placed upon his feet, he did not change his

position; nevertheless he preserved the free use of his senses and movements: he uttered no plaintive cry. At half past three, he was dying; he lay on the side without being any longer capable of motion: he was displaced without offering the slightest resistance; he yet preserved some degree of sensibility; for he then uttered some weak cries, and stretched out a little his paws: he could scarcely see, so that it was necessary to bring the objects very close to him, to make him turn away his head; his breathing was very slow; the beating of the heart could no longer be felt; there was no convulsive movement. Ten minutes after, he expired. He was instantly opened. The heart was beating very feebly, and ceased to move a minute after. The blood was fluid, and of a tolerably bright red in the aortic cavities, the lungs in their natural state, the stomach sound and empty; the rectum presented here and there some reddish spots; the wound was very much inflamed, without any eschar; the limb operated on, and all the corresponding side of the body, were infiltrated.

Experiment 5th. Twenty grains of the same extract dissolved in five drachms of distilled water, were injected into the jugular vein of a robust dog of middle size. At the end of six minutes, the animal began to make efforts to vomit, which were often repeated during a quarter of an hour. Twenty-eight minutes after the injection he had two stools; the next day, he had no appearance of being ill.

Experiment 6th. Twenty-eight grains of the same poisonous substance, dissolved in four drachms of water, were injected into the jugular vein of another robust dog of middle size. An hour after, the animal had a stool; he experienced some giddiness, and became as it were insensible, lay down, and expired two hours after the injection. It was impossible to discover the least trace of alteration in the texture of the digestive canal.

Buchner, Blair, Boerhaave, &c. have frequently seen serious accidents produced by this plant.

828. We are of opinion, that it may be concluded from the foregoing experiments,

1st. That an extract of Hedge-Hyssop produces a local irritation extremely violent;

2nd. That it appears not to be absorbed, and that its effects depend on the sympathetic lesion of the nervous system;

3rd. That it is much more active when injected into the veins.

OF THE *JATROPHA CURCAS* (INDIAN NUT.)

829. This plant belongs to the family of the *Tithymaloides* of Jus. and the Monœcia Monadelphia of Lin.

Characters of the fruit. It is first green, afterwards yellow, lastly black, nearly of the shape and size of a young walnut, and contains under a bark, that is thick, leathery, shrivelled, and smooth, three shells whitish, bivalve, and of one seed each. The seeds are oval, oblong, convex without, obscurely angular on the inside, almost cylindrical, and surrounded by two coats, proper, of which the external one is crustaceous, brittle, and blackish. Pressure alone of the kernel between the fingers, causes an oily matter to pass out. This species grows in the hot parts of America.

ACTION OF THE *JATROPHA CURCAS* ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, three drachms of this seed, deprived of its ligneous covering, and reduced to a paste, were introduced into the stomach of a robust dog of middle size, and the œsophagus was tied. At a quarter before nine, the animal began to make efforts to vomit. At nine, he uttered some plaintive cries. At ten, he could no longer walk; he remained lying on the side, in a state of great insensibility. He died an hour after. He was opened

at two o'clock. The whole of the digestive canal was red on its external surface; the mucous membrane of the stomach was of a deep cherry-red throughout its whole extent; the interior of the rectum was of a fiery red; the lungs were crepitating, and of a reddish colour; the ventricles of the heart contained black fluid blood.

Experiment 2nd. At eight in the morning, this experiment was repeated with a drachm of the same paste. The animal only felt during the day, inclinations to vomit. At ten in the evening he was insensible, could no longer stand, and made deep inspirations. He died in the night. The digestive canal was very much inflamed in the interior and exterior: the coats of the great intestines presented, throughout their whole thickness, a colour which appeared black; in separating them from one another, it was perceived that this colour was an extremely deep red: there was no eschar. The lungs presented several livid patches, dense, and distended with blood.

Experiment 3rd. Another animal, that had taken a drachm and half of the same paste, died at the end of ten hours, and the same symptoms and appearances on dissection were observed.

Experiment 4th. At eight in the morning, a drachm of the same paste, mixed with two drachms of water, was applied to the cellular texture of the thigh of a dog. The animal experienced no remarkable phenomenon during the day. The next day at noon, he was lying upon the side; his breathing was difficult and profound. He was placed on his feet, and fell down like a lifeless mass; his limbs, far from being stiff, were extremely relaxed; the organs of sense no longer performed their functions. He died two hours after. The digestive canal was sound; the lungs presented livid, dense patches, distended with blood; the limb operated on was very much inflamed; the redness extended to the fifth sternal rib. There was no eschar.

830. It results from these facts,

1st. That the seed of the *Jatropha Curcas* possesses poisonous properties that are extremely energetic;

2nd. That it appears not to be absorbed; and that its fatal effects depend on the violent inflammation it produces, and on its sympathetic action on the nervous system;

3rd. That it acts more strongly when introduced into the stomach, than when applied to the cellular texture;

The fresh root, or the juice of the *Jatropha Manihot* produces swelling of the body, nausea, vomitings, pains of the stomach, evacuations, tenesmus, vertigo, pains of the head, loss of sight, coldness of the extremities, faintings, abolition of the vital powers, and death. (Piso, *Hist. Natur.* l. iii. c. 17.)

Similar phenomena are produced by the seeds of the *Jatropha Multifida.*

OF THE SQUILL *(SCILLA MARITIMA).*

831. The Squill belongs to the family of the *Liliaceæ* of Jus. and the Hexandria Monogynia of Lin.

Characters of the onion of Squill. Large bulb, composed of several coats, which are thick, fleshy, white, or reddish, according to the varieties; frequently as big as a child's head, smooth, oval, viscous, furnished underneath with a great number of fleshy fibres. This onion possesses an acrid and bitter taste, which attaches itself to the tongue, and is perceived for a long time: it exhales a subtle, strong, acrid, and penetrating smell, like that of horse-radish. This plant is very common on the coast of Barbary.

ACTION OF SQUILL UPON THE ANIMAL ECONOMY.

Experiment 1st. At nine in the morning, two ounces and

a half of the onion of Squill whole, partly in the shape of pulp, and partly liquid, were introduced into the stomach of a small robust dog, and the œsophagus was tied. Twenty minutes after, the animal made violent efforts to vomit, which were frequently repeated during the half hour that followed, and he uttered some complaints. At half past ten, he was found dead. He was opened at eleven: the heart no longer contracted; it was filled with blackish and coagulated blood: the lungs were of a rose colour, and crepitating: the digestive canal was not the seat of any sensible alteration.

Experiment 2nd. At eight in the morning, the same experiment was begun upon a small dog. Fifty minutes after, the animal began to make efforts to vomit, and continued them for ten minutes; then the pulsations of the heart became frequent, regular, and tolerably strong; the breathing deep, and somewhat accelerated; the pupils were very little dilated, and the countenance expressed astonishment. The animal felt no giddiness, nor was he agitated with any convulsive motion; when threatened by any one, he endeavoured to bite. At twenty minutes after nine, his breathing became much more accelerated and laborious; the organs of sense and motion performed their functions freely. A quarter of an hour after, he lay down upon the belly, having a slight tendency to drowsiness; there flowed from his mouth a small quantity of a bloody serosity. At forty-eight minutes after nine, he was shook; he again attempted to bite, rose up, and ran over the laboratory; but his step was rather slow: he then lay down again, and exhibited a slight convulsive trembling of the fore feet, which only continued a few seconds. At ten, the respiration was much less accelerated, and nothing could have excited a suspicion that the animal was near dying. All at once he uttered plaintive cries; rose up: the breathing again became hurried, and he fell down on the side; the head was bent backwards upon the back, and the limbs were greatly agitated, and extremely stiff. One minute after, his cries

ceased, the limbs became relaxed, and he only lived three minutes, during which time slight convulsive motions in different parts of the body were observed. The dissection of the body took place immediately. The heart was distended, and only contracted when touched with the point of the scalpel; the blood which it contained was fluid; that contained in the aortic cavities, exhibited a red colour, rather less bright than ordinarily. The lungs were rose-coloured, and nearly in their natural state; the digestive canal presented no alteration.

Experiment 3rd. At seven in the evening, an incision was made in the inside of the thigh of a dog of middle size, and two drachms of powder of Squill were introduced into the wound: the lips were then united by suture. A few minutes after, the animal uttered some plaintive cries. The next morning at six o'clock, he was found dead. The body was cold and stiff; the wound very little inflamed: the lungs were livid, distended with blood, and little crepitating; the digestive canal presented no alteration.

Experiment 4th. At eight in the morning, thirty-six grains of the powder of Squills mixed with a drachm of water, were applied to the cellular texture of the thigh of a dog of middle size, tolerably robust. At eleven, the animal did not appear to suffer any inconvenience; and was still the same at four. At midnight, he had an attack in every respect similar to that described in experiment 2nd, and died. The limb operated on was very much inflamed; there was no remarkable lesion in the interior organs.

Plenck makes mention of a child which had convulsions in consequence of taking some Squill.

832. We are of opinion, that we may conclude from the preceding facts,

1st. That the fatal effects of Squill depend chiefly on its absorption, and the action it exerts on the nervous system;

2nd. That the lungs do not exhibit any organic lesion, and

that the acceleration of the respiration appears to depend on the nervous influence ;

3rd. That it nevertheless produces a local irritation by so much the more energetic, as death is the longer in taking place.

4th. That it excites more frequently nausea and vomitings.

OF THE *SEDUM ACRE* (HOUSE-LEEK.)

833. This plant belongs to the Decandria Pentagynia of Lin. and to the family of the *Joubarbes* of Jus.

Characters. Calyx of five oval leaflets, corolla of five petals yellow and lanceolated; five nectariferous scales at the base of the germ : five capsules. Stalks low, erect, somewhat flexuous, tender, and covered with leaves throughout their whole length; its leaves are almost oval, short, not very thick, but fleshy, pointed, and triangular, sessile, of a yellowish green colour, which becomes red when they grow old, greasy to the touch, rising around the stalk in the form of spirals composed of five leaves, in such manner that the fifth rises immediately above the first, and that the stalk, which they cover completely, appears cylindrical; there are from two to four sessile flowers upon the bifurcations of the stalk.

ACTION OF HOUSE-LEEK ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, four ounces and a half of the juice of this plant, were introduced into the stomach of a tolerably strong dog, and the œsophagus was tied. The animal made efforts to vomit at the expiration of half an hour. In the evening, he was dejected, and preserved the free use of his senses and motions. He died in the night.

Dissection. The mucous membrane of the stomach was of a fiery red in that half of it next the pylorus; the intestinal

canal appeared sound; the lungs were of a reddish colour, and somewhat more dense than in their natural state.

Experiment 2nd. The same experiment was begun again at six in the evening. The next day, at noon, the animal was lying down on the side, in a state of insensibility: he might be shaken in any manner like an inert mass of matter: the legs were affected with slight convulsive motions; the organs of sense and hearing possessed no sensibility. He died at three o'clock. The phenomena observed on dissection were just the same as in the preceding experiment.

We are of opinion that it may be concluded, that the juice of House-Leek produces a local irritation of some degree of violence, and that death depends on the consecutive lesion of the nervous system.

OF THE MEADOW RANUNCULUS *(RANUNCULUS ACRIS).*

834. This plant belongs to the family of the *Ranunculaceæ* of Jus. and to the Polyandria Polygynia of Lin.

Characters. Calyx of five leaflets, oval, broad, obtuse, smooth, coloured, and caducous: corolla of five petals, shining, oval, enlarged, and rounded at their summits, the claws of which are furnished at their base with a glandular depression, or a short small membrane: a great number of stamina, the filaments of which are shorter than the corolla. The fruits are smooth, compressed, of a brown colour, oval, sharp, terminated by the style, which is permanent, curved, and preserves for a long time its yellow colour: roots fibrous, almost fasciculated, from which arise a few straight stalks, eight or ten inches, or more, in height, hollow, very little hairy, not striated, moderately branchy. The radical leaves are petiolated, sometimes spotted, divided into three or five principal lobes, sub-divided into several others much less deep, oval or linear, incised and indented at their summit, almost

smooth, supported by smooth petioles, not striated, compressed. The superior leaves are less compound, fingered, or divided into five or three threads, straight, entire, sessile. This plant is every where found in the meadows, pasture grounds, and fields.

ACTION OF THE MEADOW RANUNCULUS ON THE ANIMAL ECONOMY.

Experiment 1st. Five ounces of the juice of this Ranunculus, prepared by triturating the leaves with two ounces of water, were introduced into the stomach of a small robust dog. The œsophagus was then tied. An hour afterwards, the animal made efforts to vomit, and moaned. He died at the end of twelve hours, and had exhibited no other phenomenon than a state of great dejection and insensibility. The mucous membrane of the stomach presented here and there patches of a lively red: the other portions of the digestive canal were in the natural state; the lungs contained a great quantity of fluid blood, and exhibited several patches which were livid, and of a dense texture.

Experiment 2nd. At eight in the morning, two drachms of a watery extract of the same plant, prepared by decoction, were applied to the cellular texture of the inside of the thigh of a strong dog. In the course of the day the animal experienced nothing but dejection. He died at ten at night. The limb operated on was tumefied, infiltrated, and very much inflamed; the inflammation extended to the muscles of the abdomen; the heart contained coagulated blood; the lungs were reddish, and distended with blood; the digestive canal was not affected with any sensible injury.

This species of Ranunculus, when applied to the temples, has produced pains, an intolerable heat, and fainting; when applied to the joints, it has stiffened them; it has almost always occasioned ulcers, and other disagreeable symptoms.

Ranunculus Sceleratus. *Plenck* relates, that the juice of this plant, administered to a dog, produced anxiety, vomitings, contortions, and great restlessness; these symptoms were succeeded by a speedy death. The interior of the stomach was red, and corroded in some points; the pylorus was tumefied, and of a livid red.

Beggars have been known to apply this plant to some parts of the body, in order to excite commiseration by the ulcers and pains it occasions.

Krapf has made experiments on himself and on dogs, in order to assure himself of the effects of this species of Ranunculus: 1st, he experienced extremely severe pains, and convulsive movements in the interior of the abdomen, in consequence of having swallowed a single flower which he had well pounded. 2nd. Two drops of the expressed juice of this plant occasioned, beside the above mentioned symptoms, a burning and convulsive pain throughout the whole length of the œsophagus. 3rd. In another experiment, he chewed the thickest and most succulent leaves of this species of Ranunculus: his mouth was filled with saliva; the tongue became inflamed and excoriated; the nipples of his breasts were elevated, of a bright red colour, and chapped at the extremity; he could no longer distinguish tastes; his teeth, which were set on edge, experienced from time to time shooting pains; the gums were very red, and bled on the slightest touch.*

Ranunculus Flammula. *Murray* asserts, that a woman had a gangrene of the arm in consequence of having applied this plant close to the wrist: it made such havoc, that the tendons and bones were laid bare. (*App. Medicaminum*, vol. iii. p. 87.)

It is well known that whole flocks have perished from grazing, in the spring, in pastures where this plant was common.

* KRAPF, *Experimenta de Ranunculosæ nonnullorum Venenatâ Qualitate, horumque Externo et Interno Usu.* Vindob. 1766.

The *Ranunculus Bulbosus, Ficaria, Thora, Arvensis, Alpestris, Polyanthemos, Illyricus, Gramineus, Asiaticus, Aquatilis, Platanifolius, Breynius,* and *Sardous,* are equally poisonous.

835. We are of opinion, that, from the foregoing facts, it may be concluded.

1st. That these different species of Ranunculus and their extracts, produce a severe inflammation of the texture to which they are applied ;

2nd. That the death resulting from them is the consequence of their sympathetic action on the nervous system ;

3rd. That they do not appear to us to be absorbed ;

836. There exists besides a sufficiently great number of vegetable poisons belonging to this class, which we shall examine succinctly: they are rarely used in medicine, and their effects are similar to those whose history we have just given.

1st. *Rhododendron Chrysanthum.* The decoction of this plant has a bitter burning taste : it is emetic, drastic, and inflames the texture to which it is applied. The *Rhododendron Ferrugineum,* according to *Welsch,* is equally poisonous. This author speaks of a meal which became fatal to the guests, for having eaten of a hare which had been fed on its leaves.

2nd. *Fritillaria Imperialis* (Imperial Crown). Several authors insist that this plant is exceedingly acrid. We have frequently given to dogs the bulb bruised : these animals did not die till after the expiration of thirty-six, forty-eight, and sixty hours ; and we were never able to discover the least trace of redness or inflammation in the digestive canal. These experiments were made in the month of June.

3rd. *Pedicularis Palustris. Gleditsch* and *Gunner* have remarked that this plant injures sheep and oxen. It has an acrid, burning taste.

4th. *Cyclamen Europœum. Boerhaave* has classed this vegetable amongst the acrid poisons, because it purges with

great violence in the dose of one drachm, and excites vomitings. The ointment prepared from it also produces the same evacuations when applied about the navel: its taste is acrid. *Bulliard* asserts, that the root of this plant produces frequently cold sweats accompanied with tingling in the ears, dizziness, and convulsive movements; the patient voids blood by vomiting and by stool: a super-purgation supervenes, which proves fatal. (*Op. citat.* p. 105.)

5th. *Plumbago Europæa.* *Sauvages* observes, that the workmen who make use of the decoction of this vegetable for the purpose of obtaining a yellow dye, are tormented by a severe head-ache, if they work longer than six hours. (*Nosologie*, tom. i. p. 842.) Its taste is acrid, almost caustic.

Seeds of *Cèvadille.* They possess an acrid taste, extremely bitter, and inflame the texture with which they come in contact.

7th. *Colchicum Autumnale.* The seed of this plant is deleterious, and a number of children have lost their lives in consequence of having eaten of it. The effects of the bulb have not yet been well ascertained. *Cratochwill* swallowed half an ounce of it, without feeling any more than a slight bitter taste in the mouth. *Stork* ate a whole bulb, and did not experience the slightest inconvenience. The illustrious *Haller* found neither flavour or acrimony in the bulbs of this plant gathered in the Autumn. On the other hand, observers worthy of confidence attest, that these bulbs, administered to animals, have produced retchings, vomitings, gripes, purging, inflammation of the stomach and intestines, and death. We have frequently given to dogs, in the month of June, two or three of these bulbs bruised, and have never perceived any sensible effects: which induces us to believe that the climate and season of the year, have great influence on their deleterious properties.

8th. *Convolvolus Scammonea (Scammony).* Several authors

assert, that the concrete juice of this root is poisonous. We have frequently administered four drachms of it to dogs, who had the œsophagus afterwards tied, and have only observed alvine evacuations. The animals died at the end of six or seven days, and some small ulcerations have been found in their stomachs. Now it will be found in the *Appendix* to this work, in speaking of the ligature of the œsophagus, that it is not uncommon to see that kind of lesion resulting from this operation.

9th. *Cerbera Ahovai.* It is asserted that the nut of the fruit of this plant is extremely deleterious. The wood, on being thrown into ponds, stupefies the fish. The fruit of the *Cerbera Manghas* is of an acrid and bitter taste ; it is emetic.

10th. *Cynanchum Erectum. Plenck* relates, that thirty-six grains of the leaves of this plant, administered to a dog, produced violent vomitings, a trembling, convulsions, and death. The *Cynanchum Vimiale* furnishes a milky juice extremely caustic.

11th. *Lobelia Syphilitica.* This plant has an acrid taste; it is emetic and purgative. The *Lobelia Longiflora* possesses still more energetic properties: we call it in Spain *Rabienta Cavallos,* because it kills the horses. *Jacquin* says, that it produces a burning inflammation of the eyes if they are touched with its juice. (Histor. Americ. Stirp. p. 226.)

12th. The *Apocynum, Androsæmifolium, Cannabinum, Venetum,* furnish a milky juice of an acrid flavour, which inflames and ulcerates the skin.

13th. *Asclepias Gigantea. Bauchin* asserts, that the juice of this plant administered in the dose of a drachm and a half, has produced very grievous symptoms, and a fatal hæmorrhage. We have frequently administered to dogs the *Asclepias Vincetoxicum:* these animals died at the end of one or two days, and their stomach was found inflamed.

14th. *Hydrocotile Vulgaris.* This plant possesses an acrid taste, and appears to be hurtful.

15th. The *Clematites Vitalba, Flammula, Recta,* and *Integrifolia,* are acrid and caustic: when applied to the skin they produce redness, pustules, and excoriations: introduced into the stomach, they occasion an inflammation which destroys the animal.

16th. *Pastinaca Sativa Annosa.* The root of this plant has been known to produce delirium, vertigo, great heat at the stomach, in the mouth and eyes, and tumefaction of the lips. (*Murray,* Op. citat. vol. i. p. 285.)

17th. The *Sælanthus Quadragonus, Forskalii,* and *Glandulosus,* are extremely acrid, and pass for being poisonous.

18th. The juice of the *Phytolacea Decandra* in the adult state is acrid, and has been known to produce violent evacuations upwards and downwards.

19th. *Croton Tiglium.* The seeds of this plant possess an acrid, nauseous, and burning taste; they purge in the dose of one grain. *Plenck* asserts, that the oil expressed from their kernels is extremely sharp.

20th. The *Arum Maculatum, Dracunculus, Dracontium, Colocassia, Esculentum, Virginicum, Arborescens,* and *Seguinum* are equally acrid. *Stork, Haller, Stehelinus,* speak of serious effects produced by the infusion of the leaves of the *Arum Maculatum.* We have administered to dogs the fresh root of this plant: they died at the end of from twenty-four to thirty-six hours, without any other symptom than dejection; and the digestive canal was found somewhat inflamed.

Bulliard relates the following fact:

"Three woodman's children ate of the leaves of this plant: they were seized with horrible convulsions. Assistance was procured for them too late; it was impossible to make the two youngest swallow any thing; they were bled without success; glysters were given them, which produced no effect: they died, one at the expiration of twelve days, another, at the expiration of sixteen. The other child was still

able to swallow, although with considerable pain, because its tongue was so swelled that it filled the whole cavity of the mouth; but deglutition became free after being bled. The child was made to drink milk, warm water, and especially an abundance of oil of olives. A diarrhœa came on, which saved the child; it was pretty well restored in a short space of time, but always preserved a very great degree of leanness." (*Histoire des Plantes Vénéneuses de la France,* p. 84.)

21st. *Calla Palustris.* The root of this plant has a burning taste.

OF NITRATE OF POTASH.

837. The Nitrate of Potash, ranked by *M. Fodéré* in the class of acrid poisons, is a salt, the poisonous properties of which has long fixed the attention of judicious physicians. Some observations reported in works on the Materia Medica, and Medical Jurisprudence tended to prove, that the ingestion of this salt might prove fatal; the experiments, which we have tried on animals, leave no doubt on this head, and it is easy to prove that in the dose of two drachms, this salt produces serious symptoms, succeeded almost constantly by death, if not expelled by vomiting.

Experiment 1st. A robust dog was made to swallow five drachms and a half of pure Nitre, in fine powder. At the end of five minutes, he vomited twice some alimentary matter, mixed with a mucous and stringy fluid; the next day, he refused food. The day following, at eight in the morning, he ate well, and experienced no remarkable symptom. At three o'clock, there was introduced into his stomach an ounce and half of pure Nitre, dissolved in four ounces and a half of distilled water, and the œsophagus was tied. Two minutes after, the animal made some efforts to vomit, which were frequently repeated during the first ten minutes. At half past three, he experienced vertigoes; at four o'clock, he was

lying down on the side, and had slight convulsive motions of the right anterior extremity; the pupils were dilated, respiration slow and deep, the pulsations of the heart weak, and not very frequent; sensibility and mobility were diminished to such a degree, that the animal could not possibly support himself a moment on his feet; this state increased, and he died at half past four. He was instantly opened. The blood contained in the heart was fluid, and of a bright red colour in the aortic auricle; the lungs appeared as in their natural state; the stomach, which was livid on its exterior, was distended by a limpid fluid; the mucous membrane throughout its whole extent exhibited a blackish red colour; it was scattered over with vessels strongly distended with black blood; the muscular coat was of a bright red; the inflammation extended to the ileon.

Experiment 2nd. At eleven o'clock, there were introduced into the stomach of a small robust dog, two drachms of pure Nitre reduced to a very fine powder, and the œsophagus was tied. At the end of five minutes, the animal began to make efforts to vomit, which lasted for half an hour. At twelve, he uttered plaintive cries. At one, he had vertigoes. At half past two, the pains he suffered appeared excruciating; he was lying upon the belly, his hind legs widely separated, the anterior ones bent; he could no longer stand for a moment, and when he endeavoured to change his position, he made a start, and fell down again like a lifeless mass: the weakness of the posterior extremities increased more and more; he gave no sign of feeling when pinched; the organs of sense possessed all their integrity. The eye-lids, and anterior extremities, were agitated with slight convulsive movements; the inspirations were rare and deep; he died at ten minutes after three. The stomach contained a tolerably great quantity of a thick stringy fluid; the mucous membrane presented here and there, throughout its whole extent, a purple red colour, scattered over in some points with black spots; the subjacent coat was

of a bright red; the remaining portions of the digestive canal and the lungs, did not appear to be injured.

Experiment 3rd. The same experiment was repeated with a drachm of pure Nitre; the animal died at the end of twenty-nine hours, after having exhibited symptoms similar to those described in the two foregoing experiments. On opening the body, the mucous membrane of the stomach was found inflamed.

Experiment 4th. A wound was made on the back of a robust dog of middle size; it was sprinkled over with two drachms of Nitre in powder, to which were added an ounce and half of water saturated with this salt: the lips were united by suture. At the end of three days, the animal did not appear any way affected. A wound was then made in the inside of the thigh of another small dog, which was sprinkled with two drachms of pure Nitre dissolved in four drachms of water, at the temperature of 40°. At the end of five days the animal ate with a very strong appetite, and had experienced no other inconvenience than what arose from the wound. An incision was made near the femoro-tibial articulation of a small lean dog. Three drachms of Nitre moistened with a drachm of water, were introduced into the wound. Five days after, the animal ate with a very strong appetite, but the wound was very considerable; it had been in a state of gangrene, and extended to the umbilical region. This animal was neglected, and he died eight days after the operation. The stomach exhibited no sensible alteration; nor did any of the other organs.*

Observations.

1st. A man labouring under a periodical fever, took by

* In another experiment the animal died two days after the application of three drachms of Nitre upon a wound made in the inside of the thigh; and on opening the body, two small ulcers were found in the stomach; several points of the mucous membrane were black, and scarified, and

mistake an ounce and half of Nitrate of Potash. A short time afterwards, the most severe anguish, with a sense of internal cold, took place at the stomach. To this succeeded fainting and syncope; and in less than ten hours the patient expired. *(Comparetti.)*

2nd. " Six years ago the late M. M. Froissard and Martin begged of me to assist at the opening of the dead body of a female servant, who was suspected of having voluntarily poisoned herself. What supported this opinion was, that for the two or three months preceding, she had become low spirited and unhappy, in consequence of obstructions in the abdomen, and suppression of the menses. This young woman, who was thirty-six years of age, was of a robust habit, of a bilious and extremely irritable temperament. She had made use of different popular remedies, infused sometimes in wine, sometimes in brandy. Two days before her death, she had taken an ounce and half of some saline substance, which she could only designate by the name of salts: this purgative, taken in two glasses, at the distance of half an hour, procured her by vomiting and stools, very copious evacuations of degenerated bile, and caused very violent pains in the bowels. The physician who was called to quiet these severe irritations, produced by a superpurgation, ordered mucilaginous decoctions in drinks, and in glysters: he was obliged even, from the violence of the pains to give opium both in substance and tincture. These remedies were without effect: the patient felt a consuming fire, which she referred to the chest and the stomach; her extremities were cold; her pulse was almost nothing; at length she expired sixty hours after having taken the salt.

" The body was opened two hours after death.

" The stomach was red, scattered over with blackish spots

there was some extravasated blood within its proper texture; but we do not attach much importance to this fact, as it is *unique*, and we cannot affirm that the animal had not swallowed some other poisonous substance.

the size of a lentil; towards the bottom of it, one of these spots was as large as a farthing; in the centre was a small hole, which perforated the viscus; the intestinal canal was interiorly reddish; the liver was obstructed, and the uterus perfectly empty.

" We understood that this girl having occasion to take a purge, one of her acquaintances had bought for her at a druggist's an ounce and half of salt of Nitre (Nitrate of Potash)."*

3rd. *M. Laflize* relates the following fact:

" A lady whom he had been attending for an erysipelatous redness of the leg, having taken by his direction for the purpose of purging her, on the 27th of April, 1787, at six in the morning, an ounce of Nitrate of Potash as it comes out of the Saltpetre Manufactory, dissolved in a glass of water, with the addition of two ounces of syrup of apples, which salt was sold by a druggist in the room of Sedlitz salt (Sulphate of Magnesia), which had been prescribed; she experienced a quarter of an hour after, the following symptoms: cardialgia, nausea, painful vomitings, evacuations downwards, and afterwards convulsions which contorted the mouth, syncope; pulse extremely weak, extremities cold; afterwards no pulse, loss of voice, consuming heat in the stomach, cruel pains in the belly which nothing could quiet; presentiment of approaching dissolution, breathing laborious; died at nine in the morning, three hours after the fatal draught.

" On opening the body, the following appearances presented themselves: stomach greatly distended by a fluid; the external coat of this viscus was of a deep red colour; some brown spots were observed in it; its mucous coat was inflamed beyond measure, and was found detached in several places: the sanguineous humour, which had flowed from the

* *Journal de Médecine, de Chirurgie, et de Pharmacie,* tom. lxxiii. anno 1787. Observation of M. Souville.

ruptured vessels, had coloured with red the contained fluid, which amounted to a pint in measure. This gangrenous inflammation began at the cardiac orifice, and ended at the pylorus; the rest of the body was in its natural state.

"It was ascertained that the cause of her death was owing to the hypersthenic action of the Nitre, by examining some of this salt, which was immediately sent for from the same druggist; and by chemical analysis of the fluid contained in the stomach, which produced by evaporation crystals of real Nitrate of Potash."

4th. A grocer's wife of Edinburgh, two months advanced in pregnancy, swallowed by mistake a handful of Nitre. Instantly came on, sharp pains of the stomach, nausea, and vomiting of several mouthfuls having the taste of Nitre. A quarter of an hour after, the whole body was swelled. There were administered, ten minutes after, some ipecacuanha, and a saturated solution of Glauber salts. The woman aborted at the expiration of half an hour, and passed by stool a great quantity of blood mixed with detached portions of the mucous membrane of the intestines; the throat was excoriated, which circumstance could not allow the patient to swallow any thing pungent. Five days afterwards, the general pains, and different nervous symptoms began to yield to the use of milk, mucilaginous drinks, and opium. M. Alexander, who has related this case, does not say whether the patient was perfectly restored to health. (*Ancien Journal de Médecine*, tom. lxxi).*

* *M. Tourtelle*, physician at Besançon, doubts whether Nitre be a poison capable of producing death. According to him, it acts only in the manner of other neutral salts. In a strong dose however it produces some accidents, such as a painful sensation at the stomach, vertigoes, coldness of the extremities, and sometimes of the whole body, fainting, &c.

A man affected with ascites, took during three weeks, aperient ptisans, with Nitre in the dose of a drachm to the pint. As he was impatient to get well, and he had heard the Nitre extolled in his disease, he took of it

838. These facts enable us to conclude,

1st. That the Nitrate of Potash, introduced into the stomach of dogs and of men, acts in the same manner as acrid or corrosive poisons.

2nd. That it is capable of producing death when it is not vomited, and has been swallowed in the dose of two or three drachms.

3rd. That it appears to act immediately on the mucous texture of the digestive canal, and subsequently on the nervous system, after the manner of stupefying poisons.

4th. That it is not absorbed when applied to the cellular texture, and consequently that it is confined, in this case, to produce local effects.

5th. That we cannot admit the opinion of *M. Tourtelle*, physician of Besançon, who believes that this substance acts like the other neutral salts. (See the note, p. 89.)

CHEMICAL HISTORY OF NITRATE OF POTASH.

839. Nitrate of Potash is a salt of a white colour, and of a cool and pungent taste. It crystallyzes in long prisms of six sides, and semitransparent, terminated by diedral tops. These crystals frequently adhere to each other in such a manner as to form flutings.

one day about two ounces in two glasses of water. He was indeed a little tormented with colics of the belly; but he was entirely cured by abundant evacuations, both by stool and urine. What is most remarkable, he experienced none of the symptoms of poisoning, although his stomach was so sensible, that it could not retain a spoonful of the weakest wine of squills.

M. Tourtelle attributes the symptoms described by *M. Laflize* to the violent action *(transports)* of the arthritic humour on the stomach of the patient, who was the subject of the other observation of *M. Laflize*. *(Journal de Médecine, Chirurgie, et Pharmacie*, tom. lxxiii. Reflexions par *Tourtelle*, p. 22. et suiv.)

840. It dissolves in four times its weight of water at 15 degrees; boiling water dissolves *four times* its weight.*

841. When thrown on burning coals, it makes them burn bright. (Vide vol. i. part ii. p. 330.)

842. Concentrated Sulphuric acid, poured upon this salt in powder, decomposes it at the ordinary temperature, and disengages vapours of Nitric acid, which are white, and not very abundant.

843. Muriate of Platina produces, in the concentrated solution of Nitrate of Potash, a precipitate of a canary yellow. (§ 623. vol. i. part ii.)

844. Lime in powder produces no sensible phenomenon on being mixed with this salt.

845. The Hydro-sulphurets do not precipitate it.

OF OXYGENATED MURIATIC GAS *(CHLORINE).*

846. This gas, which is now considered to be a simple substance by the most celebrated chemists, is called *Chlorine*, on account of its greenish yellow colour. It possesses a disagreeable taste, and an odour so suffocating, that it is impossible to respire it, even when mixed with the atmosphere, without experiencing a sensation of strangulation, and a tightness of the chest. Its specific gravity, 2,470. Far from reddening the infusion of tournesol, like the acids, it destroys it by turning it yellow.

847. When exposed to the action of caloric, the gaseous Chlorine experiences no alteration when it has been previously dried; if a mixture consisting of equal parts of Chlorine and hydrogen in a gaseous state, be introduced into a flask full of water, and inflamed, by means of a lighted taper, there takes

* This is evidently an error, perhaps from inadvertence; the quantity of Nitre which boiling water is capable of dissolving, being about its own weight.—TRANSLATOR.

place instantly a detonation, and formation of hydro-chloric (muriatic) gas, which appears in the form of white vapours.

848. Solid phosphorus, arsenic, tin, and pulverized antimony, combine rapidly, and at the ordinary temperature with Chlorine, when plunged into a flask filled with this gas. Solid Chlorurets *(Chlorures)* are constantly obtained, and there is a disengagement of caloric and of light: this last phenomenon is owing to the passage of the Chlorine from the gaseous to the solid state.

849. Chlorine dissolves in water, and forms liquid Chlorine. Being mixed with hydro-sulphuric gas (sulphurated hydrogen) it becomes decomposed, seizes upon its hydrogen, in order to pass into the state of hydro-chloric acid, and the sulphur is set at liberty.

ACTION OF GASEOUS CHLORINE ON THE ANIMAL ECONOMY.

M. Nyston, who published in 1811 a very beautiful work on the injection of gases, into the veins, arteries, pleura, &c. made some experiments upon Chlorine, which we have repeated, and which we have found to be extremely correct.

Experiment 1st. Ten or twelve centimetre cubes of gaseous Chlorine, were injected into the jugular vein of a dog of middle size, at the temperature of 9°. R. The effects of this injection were confined to a little moaning. At the expiration of five minutes, a fresh injection was made of twenty centimetre cubes of the same gas: at the end of one minute, the animal uttered some cries, indicative of suffering; the breathing became difficult and rare, and he died three minutes after the last injection. On opening the body, which was done four minutes after death, blood was found entirely fluid, and similar to venous blood in the pulmonary auricle and ventricle, which contained neither gas, nor coagulum.

Experiment 2nd. At forty-five minutes past eight, there

were injected into the right pleura of a dog of six *kilograms* in weight, sixty centimetre cubes of gaseous Chlorine at the temperature of 13°. R. Immediately after, violent agitation, and discharge of urine took place; the animal fell down on his side, stretched himself out a moment, and gave a shriek, as if in extreme pain. Shortly after, he walked about; but continued to complain. At twelve o'clock, he complained no longer; was for the most part lying down. At fifteen minutes after four, he had a trembling of the limbs; no moaning. The next day, he was melancholy, and remained lying down. The third day, he was killed. Both pleuras were covered by a false membrane, and contained each about a hundred *grains* of a reddish serosity. By growing cold there formed in the heart concretions apparently gelatinous, similar to those observed as resulting from inflammatory diseases, and which have a great analogy to the pleuritic crust.*

It is known by a great number of experiments, that animals quickly perish when plunged into the gaseous Chlorine. *M. Nysten* says on this subject: "This gas is not absorbed when respired pure; it appears to act only by irritating the bronchia locally, and its action is so energetic, that the animal dies before becoming asphyxied by the black blood. What proves beside, that it acts only by irritating, is, that when it is respired diffused in the atmosphere in too small quantity to destroy life in the lungs, it confines its action to the producing a cough more or less severe, and sometimes, as it has been observed by Fourcroy, a phlegmasia of the mucous membrane of the bronchia." (*Recherches de Physiologie et de Chimie*, p. 144, anno 1811.)

* (*Couenne Pleurétique*) the buff coat observed on the blood after venæsection.—TRANSLATOR.

ACTION OF THE FLUID CHLORINE ON THE ANIMAL ECONOMY.

Experiment 1st. At nine o'clock, five ounces of solution of Chlorine moderately concentrated, were introduced into the stomach of a small strong dog, and the œsophagus was tied. Ten minutes after, the animal began to make violent efforts to vomit. At twelve o'clock, he was very much dejected, and complained greatly. He died in the night. The mucous membrane of the stomach was of a black red throughout the whole of its extent: the other organs appeared sound.

Experiment 2nd. The same experiment was repeated with two ounces of the above solution, which had previously been weakened by four ounces of water. The animal died in a state of dejection, four days after the ingestion of the poisonous substance. The mucous membrane of the stomach, which was not very red, exhibited towards the great extremity a few small ulcers surrounded with a yellow areola. The interior of the duodenum and of part of the jejunum, were lined with a yellow coat of tolerable thickness, proceeding without doubt from the decomposition of the bile, by the hydro-chloric acid formed at the expense of the Chlorine, and of the hydrogen of the organic texture.

Experiment 3rd. *Javel* water, into which Chlorine enters, produced an action upon animals similar to that we have just described.

850. These facts prove that the fluid Chlorine, acts in a manner similar to that of the mineral acids of which we have already spoken, vol. i. part ii.

OF NITROUS ACID GAS.

851. The Nitrous Acid Gas is of an orange yellow colour; it has a strong smell, extremely disagreeable; its taste is acrid

and caustic; it reddens the infusion of tournesol, dissolves rapidly in water, and attacks mercury. Its action on the metals, and on organized substances, is in general stronger than that of the Nitric Acid. These characters are sufficient for distinguishing this gas from every other production, natural or artificial.

ACTION OF NITROUS GAS ON THE ANIMAL ECONOMY.

Observation.

1st. A man, about forty-five years of age, of a tolerably strong constitution, but subject to an habitual oppression, followed, for several years, the dealing in *Aqua Fortis.* In the month of May, 1804, the heat was considerable, and the thermometer had ascended as high as 26°: he was awoke one morning, at four o'clock, by the howlings of a great watch dog, which he had shut up in his warehouse. He immediately went down stairs, accompanied by a neighbour, opened the door, and was struck instantly by the smell of Nitrous Gas which he perceived.* The dog rushed out precipitately, having his feet burnt, and ran to the nearest stream to quench his thirst; he played with some other dogs in the neighbourhood, and returning two hours afterwards, died at the door of his master, vomiting thick matter of different colours. The master however penetrated notwithstanding into the warehouse in order to set open the windows; but he had scarcely remained there five minutes, when he was obliged to return, being threatened with suffocation: he went in again

* *M. Degranges,* who is the author of this observation, and all who have copied it, have attributed this poisoning to the Nitrous gas; but it will be sufficient to recollect that this gas cannot remain an instant in contact with the atmospheric air, without carrying off its oxygen, and converting it into Nitrous Acid Gas, in order to be convinced that it is the acid gas which has occasioned the symptoms reported in this observation.

however in a short time afer, and brought out the case containing the broken bottles. About six o'clock, he went to take a little milk in a coffee-house, and then drank half a bottle of wine, and after taking a little turn in the town, returned home before eight o'clock, complaining of great debility, of a dry and acrid heat in the throat, irritation of the stomach and breast, and a sense of constriction in the epigastrium : his habitual difficulty of breathing had not increased in proportion. He was advised to drink copiously of milk. His physician, who arrived soon after, approved of this beverage, and prescribed besides fomentation to the abdomen, and the application of mustard to the arms. These two means appeared to be excessively fatiguing to the patient, and increased his anguish : he continued only the milk, and towards one o'clock affirmed that he suffered less. He then passed spontaneously a yellowish stool, and, in the space of an hour, two more, all of which were of a citron colour; the urine was scanty, and towards evening the patient was tormented by frequent and fruitless desires to make water. At four o'clock, he began to expectorate a yellowish matter, which excited some hope; he resumed the employment of the milk, which he had discontinued for some hours, and alternated it with *orgeat:* he had afterwards a little cough, some nausea, and a slight vomiting. Some glysters were given him, which were instantly returned, and yet were tinged with yellow. At nine in the evening, the patient's face became bluish, and his breast embarrassed, with some degree of rattling; some hiccup was observed, and considerable pains were felt in the region of the diaphragm; there were likewise some convulsive movements and slight delirium. Towards morning the anxiety increased, the anguish became inexpressible; the patient however drank some milk at five and at six o'clock, preserving all his senses. At seven he was no more. Shortly after death, his belly swelled, and became distended in a very remarkable manner; his face became purple, his lips black, and a few drops of blood flowed

from the nose and from the mouth. The body was not opened.*

M. Nysten, who has made a great number of experiments on the Nitrous Gas, is convinced that it produces death in a very short time, and that it turns the blood brown. The Nitrous Acid Gas, of which we have given the history, and which is composed of Nitrous Gas, with the addition of oxygen, appears to us to act, 1st, by irritating strongly the bronchia, and small pulmonary vessels; 2nd, in causing the blood to undergo an alteration similar to that of the Nitrous Gas.

852. The fluid Nitrous Acid, exerts on our texture the same action as that we have described under the Article *Nitric Acid,* (Aquafortis) vol. i. p. 2.

OF SULPHUREOUS ACID GAS.

853. The Sulphureous Acid Gas is constantly disengaged whenever sulphur is burnt in the open air, or in oxygen gas; it is recognized by the following properties. 1st. It is colourless; 2nd, it has a pungent smell, which is the same as that of burning sulphur; 3rd, it reddens the tincture of tournesol, which it changes in the end to a straw yellow; 4th, it is very soluble in water.

854. According to *M. Hallé,* it kills Guinea-pigs who respire it, in less than a minute and a quarter. Its effects depend upon the irritation it produces in the lungs.

855. After having explained in detail, the phenomena produced by this class of poisons, we shall proceed to point out in a general way, the symptoms and lesions of texture to which they give rise: by these means we may be able to establish some general data, with respect to their mode of action, and the mode of treatment necessary to adopt in order to counteract their effects.

* *Dictionnaire des Sciences Medicales,* tom. ii. p. 388.

SYMPTOMS PRODUCED BY THE ACRID POISONS.

856. A short time after the administration of these poisons, there is felt an acrid, pungent taste, more or less bitter, a burning heat, and considerable dryness in the tongue, and in every other part of the mouth, and a constriction, more or less painful, in the throat. Shortly after, acute pains begin to be felt in the stomach and bowels, which are quickly followed by nausea and copious evacuations upward and downward. These evacuations sometimes take place without effort; but more frequently they are excessively painful, and the animals strain to provoke them, when the digestive canal has been completely emptied. The pulse and beatings of the heart are strong, frequent, and sufficiently regular; respiration is somewhat accelerated, and no remarkable change can be perceived in the manner in which their sensations and motions are executed. A few hours after, phenomena are observed, which announce a lesion of the nervous system. The animals are almost in every instance affected by vertigoes, they begin to stagger, their pupils become dilated, they fall into a state of great insensibility, respiration and the circulation begin to fail, and they expire without uttering the least complaint. Sometimes they experience convulsions more or less violent, their limbs become stiff, they utter plaintive cries, and expire.

LESIONS OF TEXTURE PRODUCED BY THE ACRID POISONS.

857. When poisonous substances of this class have been introduced into the stomach, in a dose sufficiently strong to kill the animals, alterations, more or less considerable, are discovered, the intensity of which depends in general on the nature of the poison ingested, and the period at which the animals have fallen victims to it.

1st. The different parts of the mouth, œsophagus, stomach, and intestinal canal are inflamed; sometimes the mucous membrane only presents, throughout its whole extent, a fiery red colour; sometimes this colour is of a cherry, or of a blackish red; in that case it is not uncommon to see the muscular and serous coats partake of this inflammation, and a number more or less considerable of black spots resembling sloughs, or longitudinal zones of a deep red colour, are discovered, which depend on the extravasation of black blood between the coats, or in the chorion of the mucous membrane. Sometimes small ulcers are found near the pylorus; but most frequently the inflammation confines itself to the fauces, stomach, and great intestines, which phenomenon appears to arise from this cause, that the poison has been longer in contact with these parts than with the others. It is easy to perceive, that the lesions we have just described have the greatest analogy to those produced by the corrosive poisons (vol. i.). In fact, we do not hesitate to declare, that there exists a perfect identity between the alterations of the digestive canal produced by the poisons of these two classes when introduced into the stomach.

2nd. The lungs exhibit very commonly lesions more or less considerable; their colour is sometimes violet; but in general it is a deeper red than in the natural state. Their texture is more tight, dense, distended with blood, and less crepitating, at least some parts of them: it is not uncommon to find in them a bloody serosity. These phenomena may arise from the repeated and fruitless efforts to vomit; we are of opinion however, that they are frequently the result of a special action of the poisonous substance upon the lungs: the hellebore seems to us to be principally in point.

3rd. The ventricles and auricles of the heart, are more or less distended by blood differently coloured, according to the period at which the dissection takes place. In a number of circumstances, this fluid is found coagulated one or two hours

after death, and it is almost constantly in this state at the end of fifteen or eighteen hours. This pathological fact, of which we warrant the correctness, is far from confirming the opinion advanced by some authors, that in poisoning by vegetable substances the blood remains fluid for a long time. In truth, they have principally wished to speak of narcotic substances; but we shall see, when giving the history of these poisons, that their assertion is totally void of foundation.

4th. The brain and its meninges exhibit no notable lesion in cases of poisoning by acrid substances; nevertheless, a fulness of the veins creeping over the external surface of this viscus, is sometimes observed.

5th. The other organs have not appeared to us to undergo any sensible alteration from poisonous substances of this class.

858. When applied to the surface of the skin, or the cellular texture, these poisons produce the local phenomena which we have described (page 1, of this volume); and when death takes place, the lesions we have enumerated, are found, excepting that the digestive canal is seldom affected.

859. It results from the foregoing considerations: 1st, that, in a case of poisoning, the juridical physician will be often greatly embarrassed to determine, from the simple *lesion of the internal organs,* whether the poison ingested belong to the class of acrid, or to that of corrosive poisons; 2nd, that, in the case where chemical analysis shall have proved that the poisoning has not been produced by one of the corrosive poisons, and that every thing favours the belief of its belonging to the class of *acrid poisons,* it will be impossible to decide, by the simple *examination of lesions on dissection,* what is the poison that has produced them, these lesions being pretty nearly the same in all; 3rd, in fine, that, taking into consideration the symptoms, and especially the intense inflammations produced by acrid substances, we cannot confound the poisoning produced by them, with that which

results from the narcotic, or even by the narcotico-acrid, poisons, which either do not inflame the texture of the organs, or produce only a very slight inflammation.

GENERAL ACTION OF ACRID SUBSTANCES ON THE ANIMAL ECONOMY.

860. It seems natural to pass to general considerations on the mode of action of the poisons contained in each class, after having given their particular histories in distinct sections, and described the lesions and general symptoms to which they give rise. It is evident that no inconvenience can follow this method, when the individuals which compose the class unite together a very great number of common characters, and their physiological action is almost identical. Generalities are then even indispensable, on account of the facility they afford of retaining a multitude of important facts. But is this the case with the class we are treating of?—We are of opinion that it is not. How many substances do we see classed together, which evidently exercise a different mode of action. What connexion is there, for instance, between the Hellebore, the Spurge-flax, and the *Jatropha Curcas*?—Do not these two latter substances act by producing a strong inflammation, whilst the first, being rapidly absorbed, exerts a fatal action on the nervous system, and produces only a slight inflammation? If we have united in one catalogue objects so dissimilar, it is because they are found in the classification proposed by *Vicat*, adopted by *Fodéré*, and which we have followed. We are conscious of the extreme difficulty attending a new arrangement founded on the mode of action of poisons; and, till we shall have multiplied the experiments in the different climates of Europe, we shall not hazard the proposal of an Essay at Classification. These considerations will exonerate us from giving to this article all the extent it is capable of

receiving; we shall confine ourselves to the propositions following:

1st. The major part of acrid poisons produce a strong local irritation followed by inflammation, more or less intense, of the parts to which it has been applied, and death takes place through the sympathetic irritation of the nervous system, without the poison being absorbed: the animals almost constantly die in a state of dejection, and of general insensibility. In these cases, the phenomena of poisoning make their appearance more rapidly when the poison has been introduced into the stomach, than when it has been applied to the cellular texture. The Spurge-flax, *Jatropha Curcas*, &c. appear to act in this manner.

2nd. Sometimes, after having inflamed the texture, the poisonous substance is slowly absorbed, and carried into the circulation; and its effects depend on the direct action it exerts on the nervous system, and on the sympathetic irritation of this same system. Under certain circumstances, the poisons thus absorbed act on the rectum; such are the colocynth and savine. Some affect the lungs also.

3rd. There exist a certain number of acrid poisons, which are rapidly absorbed, and carried into the circulation, and which produce in a short time repeated vomitings, vertigoes, and the most perfect stupefaction. The roots of black and white hellebore are of this number. Death takes place more speedily when these poisons are applied to the cellular texture, than when they are introduced into the stomach. Does this phenomenon depend on the digestion of the hellebore in this viscus, and on its decomposition, or is the venous absorption more active when a wound is made in the thigh, and some small veins have been consequently cut?——Be it as it may, these poisons produce a slight inflammation, and exert an action on the lungs.

4th. Lastly, some of the poisonous substances of this

class are rapidly absorbed, and give rise to vertigoes, violent convulsions, complainings, &c. phenomena which appear to partake both of excitement and stupefaction, and which depend on an immediate action upon the nervous system. They produce, besides, inflammation of the texture with which they come in contact: this is the case with Aconite.

861. It will be observed, without doubt, in the preceding propositions, that we admit the absorption of some of the poisons of this class, whilst at the same time we attribute the effects produced by the rest, to a sympathetic irritation of the nervous system. We believe we are able to explain the reasons which induce us to admit, or to reject their absorption.

A. It is evident that, if the poisonous substance when applied to the cellular texture, exerts only a slight local action, and produces, in a short time after its application, vomitings, vertigoes, convulsions, and death, in the course of a few hours, we ought to admit *that it has been absorbed.*

B. For a still stronger reason may we affirm, without fear of error, that the poisonous substance *has been absorbed* in the case where the application to the cellular texture has been immediately, or almost immediately, followed by symptoms more or less serious, terminated by death, and on dissection there are discovered inflammations in the lungs, or digestive canal, as takes place with tartar emetic, arsenic, and corrosive sublimate.* Again, it appears certain that *it has been absorbed,* but in a slow manner, when, being little soluble in water, its application to the cellular texture is not followed by any remarkable symptom, till after the expiration of four and twenty, or six and thirty hours; death does not supervene before

* My friend and pupil, Dr. Smith, has just supported an excellent inaugural dissertation entitled, *Essai sur le Danger de l'Application des Caustiques;* in which he proves that corrosive sublimate is absorbed, when applied to the cellular texture, and that it produces constantly inflammation of the stomach. (Vide *Appendix* at the end of this volume.)

two or three days; and it has only exerted a local inflammatory action, not very violent, and which cannot be regarded as the cause of death.

C. It is also extremely easy to conclude, that *it has not been absorbed,* when its application to the cellular texture is not followed by any general symptom, and is confined to the production of an extensive slough. Thus we may cauterize repeatedly the limb of a dog with concentrated sulphuric acid, caustic potash, nitrate of silver, &c. several days will elapse before the animal will discover the smallest sign of derangement in the functions performed by the principal organs, and it is not till nature shall have excited an inflammation, in order to throw off all those parts which have become extraneous, that the animal can sink under the excess of pain.

D. But can it be concluded that the poisonous substance *has been absorbed* in cases where it produces a very violent inflammation in the cellular texture, with which it has come in contact, where death takes place on the first or second day, when the animal has not vomited, when no lesion of the principal organs is discovered after death, and nevertheless the substance is dissolved in water, and placed in the interior of the thigh, near to the lymphatic vessels, and a multitude of venous ramifications?—Such is the question on which we wish to throw light, and it embraces a multitude of substances; for instance, Nitre, Euphorbium, Jatropha Curcas, &c. We are of opinion, 1st, that it is of no use to admit the absorption of any of these substances, in order to explain the phenomena they produce; 2nd, that it is probable it does not take place. The first of these propositions will appear evident, if we call to mind that the application of these substances produces a violent inflammation, accompanied by severe pains, which may be compared to an extensive burn. Now we know, that in affections of this nature, sympathetic lesion of the nervous system has often produced, in animals, a speedy death, without any absorption having taken place.

In what manner has the nervous system been affected?—— The following are the data which tend to induce a belief that *none of these substances have been absorbed.* Strictly speaking, we cannot acquire the certainty that a poison has been absorbed, unless it shall be found in some part or other of the internal organs; nevertheless it is agreed on to admit absorption whenever, after a speedy death, inflammatory phenomena, or sloughs, are discovered in any part where the poison has not been applied; as for example in the digestive canal; or when, a short time after its application to the cellular texture, the animals are seized with vomitings, vertigoes, convulsions, &c. Now the poisons in question produce none of these effects. Besides, a great number of substances which are evidently absorbed, act much more rapidly when applied to the cellular texture of the thigh, than when introduced into the stomach: such are the Hellebore root, both black and white, Upas-tieuté, Nux Vomica, Purple Foxglove, Opium, &c. In this case, on the contrary, death takes place constantly much later when the poison has been injected into the cellular texture, which seems to prove that it depends on the nervous irritation, which is much more violent in the stomach than in the limbs.

862. It will probably be objected that the poisonous substances we are speaking of are capable of being absorbed, and of producing, independently of a violent local irritation, effects more or less sensible on the texture of the internal organs; in this case death would depend on several different causes. This objection may be of some weight, but it is not founded on any fact of pathological anatomy, and consequently we cannot admit it.

It is *moreover possible* that we may be accused of wishing in almost every instance to explain death by the unappreciable lesions of the nervous system. In fact, it may be said to us, (especially after reading the different articles contained in this volume) the nervous system is affected in a multitude of

ways which bear no apparent resemblance to each other: what is there in common between the symptoms produced by Camphor, *Cocculus Indicus*, Nux Vomica, Upas-tieuté, and those produced by Opium, Hellebore, Cherry Laurel, or still more by Squill, Purple Fox-glove, Euphorbium, Bryony, Gamboge, the different corrosive poisons, &c. &c.? The knowledge we have of the infinite lesions of which the nervous system is susceptible, is so confined, that it would be needless to try to give a satisfactory solution of this question; it is nevertheless perfectly demonstrated, a multitude of different causes are capable of affecting this system, and producing affections, which have very little resemblance to one another. Examine the list of mental derangements, so ably delineated by the illustrious *Pinel*, how striking the difference in comparing the furious maniac with the idiot! and again what relation is to be discovered between these affections and epilepsy, paralysis, *ataxic* fevers, and a multitude of the *neuroses*, unless that there is a derangement in the sensitive faculty, and in the phenomena depending upon it? We shall make it appear, however in the sequel, that certain poisons, which act on the nervous system, affect peculiarly and constantly certain parts of it, such as the brain, the spinal marrow, &c. &c.

TREATMENT OF POISONING BY ACRID POISONS.

863. Does there exist any antidote to the acrid poisons?

If it be admitted that an antidote is a substance capable of decomposing the poison in the stomach, and of forming a fresh compound which does not act on the animal economy, we can affirm that we know of no body possessed of this property with regard to the acrid poisons. These poisons belong for the most part to the vegetable kingdom; now the analysis of vegetables is too little advanced for us to be able to determine exactly what is the intimate nature of the poison-

ous principle which they contain, and consequently what is the re-agent capable of decomposing it. It would be absurd, in the present state of science, to attempt to arrive at the solution of such a problem by theory; there would hardly be any thing more than conjecture and chance which could conduct us, with the aid of a multitude of experiments, to a discovery of this sort. Let us hope that modern chemistry, by bringing to perfection vegetable analysis, will furnish us with the means proper for elucidating this important subject.

864. But if no antidote exists for acrid poisonous substances, there are abundance of medicines which, properly administered, are capable of quieting, diminishing, and even of removing altogether the symptoms of poisoning. What then is the line of conduct to be pursued by a physician called in to a disease of this kind?

865. If the poison swallowed be of that kind which acts by producing a violent inflammation, succeeded by a sympathetic affection of the nervous system (and almost all the poisons of this class act in that manner), the antiphlogistic treatment must be employed, after having encouraged vomiting by the assistance of copious warm mucilaginous drinks, and even by means of cold water. Emetics, vinegar, and all other substances that are capable of increasing the irritation of the parts already affected, are to be avoided with great care, as we have had occasion to observe in a great number of experiments made on that subject. In cases where the vomitings should be extremely violent, a few drops of Sydenham's liquid laudanum should be administered; in fine, the data we have before established in speaking of corrosive poisons should be entirely followed. (*Vide* articles, *Corrosive Sublimate* and *Arsenic*, vol. i. p. 1.)

866. If the poison should be of the number of those which are rapidly absorbed, and which direct their principal action to the nervous system, the kind of lesion of that system must be paid attention to. Thus, for example, the poisoning pro-

duced by the roots of hellebore, which occasion a very remarkable stupefaction, will be combated by an infusion of coffee and camphor in small doses frequently repeated; and if these medicines are thrown up a short time after their ingestion, they must be used in injections and in frictions: it must not however be forgotten, that these poisons produce also an inflammation, which must be combated by emollient drinks. Lastly, in these kinds of poisonings, recourse must be had to emetics only in cases extremely rare, where the poisonous substance shall not have excited copious vomitings.

867. If, instead of being stupefied, the nervous system be in a state of great excitement, which very seldom happens with poisons of this class, recourse must be had to opiates, and the different medicines which are capable of diminishing this excitement.

868. We may then reduce to the following precepts whatever relates to the treatment in question: 1st, to favour vomiting by copious mucilaginous drinks, at least unless the poisons should naturally provoke sufficient evacuations: 2nd, to appreciate the nature of the secondary phenomena produced, and to combat them by appropriate means, which will vary according to the kind of lesion that has taken place. . . . .

CHAPTER IV.

Class 4th. OF NARCOTIC POISONS.

869. The denomination of *Narcotic Poisons* is given to those which, being rapidly absorbed, produce stupor, drowsiness, paralysis or apoplexy, and convulsions.

OF OPIUM.

870. Opium is a gummy resinous juice, produced by incision of the head of the white or garden poppy *(Papaver Somniferum)*, and concreted. It is heavy, compact, homogeneous, soft, of a reddish brown colour withoutside, slightly shining, opaque, plastic, somewhat capable of adhering to the fingers; its fracture presents a greenish or blackish tinge; its smell is strongly virulent and nauseous; its taste acrid, bitter, and hot. It inflames when brought near a lighted candle, and burns with a strong brightness: its odour at that time is not Narcotic. It dissolves partly in water, whatever be its temperature: warm water softens it, and reduces it to a soft paste, so that it may be cleared from extraneous bodies, by passing it through cloth with expression. Vinegar, lemon-juice, wine, and alcohol, equally produce the solution of a part of the opium. *M. Desrosne,* who has been successfully employed on the analysis of this juice, has found, 1st, a crystallizable substance; 2nd, an extractive matter; 3rd, resin; 4th, oil; 5th, an acid; 6th, a small quantity of feculent mat-

ter; 7th, mucilage; 8th, gluten; 9th, remains of vegetable fibres, and sometimes a small quantity of sand and little stones.

ACTION OF OPIUM ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, a small robust dog was made to swallow three drachms of crude Opium. At ten, the animal experienced no sensible phenomenon. At half past twelve, his posterior extremities were extremely weak, and paralyzed; he kept himself lying always on the belly. The muscles of the trunk and face were attacked with violent convulsions, so that the animal made strange contortions of countenance, and was every moment moved from his place, notwithstanding that he supported himself firmly upon his four legs. His physiognomy exhibited stupidity; the pupils were not more dilated than in their natural state; the organs of vision and of smelling exercised their functions freely; the animal did not moan at all, but appeared extremely dejected; the pulsations of the heart were slow and feeble. At six in the evening, the convulsive twitchings were stronger and more frequent; the whole of the posterior parts were completely paralyzed. He died in the night. The next day he was opened; and it was remarked that the head was slightly reversed toward the back, the legs stiff, and separated one from the other. The stomach contained almost the whole of the Opium, which might be recognized by its smell. The mucous membrane of this viscus was covered over with a slight whitish colour, easily detached, and presented no vestige of inflammation; the lungs exhibited several livid patches distended with blood, very little crepitating.

This experiment, repeated upon other dogs with the crude Opium, or with the watery extract, furnished similar results.

Sometimes however, the animals vomited after having experienced effects more or less decided, and some of them have recovered without receiving any assistance.

Experiment 2nd. At half past eight in the morning, two drachms of the aqueous extract of Opium, were introduced into the stomach of a small dog, weakened by an experiment made a few days before, and the œsophagus was tied. Twenty minutes after, the posterior extremities began to grow weak, and the animal uttered plaintive cries. At eleven o'clock he was attacked with violent convulsions; he exhibited a tremor of the head, and a great tendency to drowsiness: nevertheless he both saw and heard extremely well. At three, the posterior extremities were completely paralyzed; the animal made from time to time slight leaps, similar to the shocks impressed on frogs, by the disengagement of the fluid from the voltaic apparatus. At six, he was lying down on the side in a state of great debility. He died at eight. The next day he was opened. The digestive canal exhibited no alteration; the blood contained in the ventricles of the heart was black, and coagulated; the lungs presented livid spots, the texture of which was dense, and distended with blood.

This experiment repeated several times on other dogs, furnished similar results. When the dose of the extract swallowed was three or four drachms, the animals died two or three hours after taking the poison. In general the pulsations of the heart became stronger and more frequent. There were however some in which the circulation became slower.

Experiment 3rd. At forty minutes past seven, was injected into the cellular texture of the thigh of a small dog, one drachm of the watery extract of Opium, dissolved in two drachms and a half of water; the edges of the wound were retained by suture, and it was ascertained that the pulsations of the heart were to the number of ninety in a minute. Five minutes after, the animal began to moan; his posterior extremities were weak, and as it were paralyzed; the heart

beat a hundred and twenty pulsations in a minute. At the end of four minutes the paralysis of the posterior extremities was complete, the circulation more accelerated, and the contractions of the heart stronger than before. At five minutes past eight, the animal was suffering violent convulsions; he kept himself lying on the belly, with the posterior extremities separated and stretched out, the anterior firmly fixed to the ground, the head bent backwards; the heart beat one hundred and forty strokes in a minute. These phenomena only lasted a few minutes; but they might be instantly reproduced at pleasure by a slight shock given to the animal. At thirteen minutes after eight, the limbs were stiff, and the animal in a state of great dejection; the head, which appeared very heavy, exhibited a very remarkable trembling; the muscles of the lower jaw were agitated by convulsive movements; the moaning continued, and the circulation by no means relaxed. These symptoms went on increasing, and the animal died at twenty-five minutes after eight; he had preserved the free use of the organs of vision and of hearing. He was immediately opened; the body was by no means stiff; the heart contracted, and was somewhat flabby; the blood contained in the left ventricle was fluid, and rather of a bright red; the lungs, which were of a rose colour, were rather less crepitating than in their natural state.

Experiment 4th. At half past seven, half a drachm of a watery extract of Opium, mixed with a drachm of water, was applied upon the cellular texture of the thigh of a strong dog of middle size. Seven minutes after, the animal was lying upon his side, and had a decided propensity to sleep; the pulse beat ninety times in the minute. At three quarters after seven, the posterior extremities were feeble; the animal was lying as if asleep, and woke from time to time with a start; he had some convulsions. At eight o'clock the paralysis of the posterior extremities was complete. Twenty minutes after, the heart beat a hundred and thirty strokes in a minute;

the contractions were strong, unequal, and intermitting; the trunk and head were attacked with violent convulsions, which took place by starts, and which could be produced at will on touching the animal: he then stretched out his head, and reversed it upon the back; his fore-feet were firmly fixed to the ground: he uttered no moan. At forty-three minutes after eight, the pulsations of the heart were to the number of a hundred and fifty per minute. At a quarter past nine, the agitation was increased, principally in the fore-feet, with which the animal at intervals beat the ground, and with some force. At half past eleven, the head was trembling, the shocks were violent enough to lift the whole body. These symptoms went on progressively, and the animal died at five minutes before one o'clock. He was opened the next day: the lungs were livid, distended with blood, dense, and somewhat crepitating; the blood contained in the ventricles of the heart was coagulated; the digestive canal presented no alteration; the wound was very little inflamed.

Experiment 5th. At half past ten in the morning, fifty grains of a watery extract of Opium were applied upon the cellular texture of the thigh of a small dog, and the wound was united by suture. The animal in a short time experienced the symptoms described in the preceding experiments, and died an hour and half after.*

Experiment 6th. At a quarter before one, the same experiment was repeated with a drachm of the extract of *black poppies.* At two, the animal was uttering plaintive cries; his posterior extremities began to bend; the pupils were a little dilated, and there was a slight tendency to drowsiness; the breathing was neither laborious nor accelerated; the contractions of the heart were slower, being only fifty-six

* It is essential to remark that two drachms of the same extract, introduced into the stomach, do not destroy dogs in less than ten, twelve, eighteen, and twenty-four hours, even when vomiting is prevented by tying the œsophagus.

in the minute; the mouth was filled with saliva. Six minutes after, he vomited, at two different times, a tolerably large quantity of fluid matter. At half past two the drowsiness was increased, and the animal continued to moan. At four, the pulsations of the heart were not more accelerated. At half past six, he was walking about well enough; nevertheless he died in the night. The wound was slightly infiltrated with blackish blood; it was very little inflamed; the mucous membrane of the stomach was lined with a stringy mucus, thick, and of a grayish colour; the inferior lobe of the lungs was distended with blood, and reddish; the blood contained in the ventricles of the heart was black and coagulated, and the animal had only been dead four or five hours.

Experiment 7th. A drachm of watery extract of Opium was injected into the anus of a small dog, dissolved in an ounce of water; the fluid was almost instantly returned: nevertheless at the end of two minutes, the animal vomited twice, and had a tendency to drowsiness. Five minutes afterwards, he could with difficulty support himself on the hind-legs, and appeared to be plunged into a profound sleep. The heart beat only fifty-five strokes in the minute, but its contractions were strong, and somewhat irregular. Half an hour after the injection, the muscles of the face, neck, and lower jaw, were agitated by slight convulsive movements; the posterior extremities were from time to time affected by tolerably violent twitchings; the pupils were moderately dilated; the animal was very little sensible; when shaked briskly however he endeavoured to get up, by supporting himself on his fore-feet, and instantly fell again. These symptoms lasted several hours, then disappeared insensibly, in such a manner that in the course of two days, and without any assistance, the animal was perfectly restored.

The same experiment repeated upon other dogs gave similar results. Often enough however the poison has been returned in a few seconds after, and the animals experienced

only vomitings and a slight paralysis of the posterior extremities : this more particularly happens if, for the watery extract of Opium, a decoction of *Poppy heads* be substituted.

Juarin had already observed, that a single grain of Opium, or twenty drops of *Sydenham's Laudanum*, given in a glyster, had produced a remarkable uneasiness, and an incipient paralysis of the inferior limbs. (*Animadversiones Practicæ*, p. 234.)

Cotunni, in his work *de Ischiade Nervosâ*, § 42, asserts, that he believes that Opium injected in a glyster, may have greater efficacy than in any other way. This opinion is at this moment entertained by a very great number of enlightened practitioners.

Experiment 8th. Eight grains of the watery extract of Opium, dissolved in three drachms of water, were injected into the jugular vein of a great dog. The animal instantly fell down on the side, and appeared to be asleep; his posterior extremities were paralyzed, and he could not possibly keep on his legs; the pulsations of the heart were not more frequent than before the injection. Twenty minutes after, the relaxation of these was very remarkable; the animal uttered no plaintive cry, and when shaken he awoke, but fell into a sleep again a few moments after. The next day he walked about tolerably freely, and was scarcely at all drowsy. He constantly refused food, and died eight days after the injection, without having experienced any other symptoms than dejection, and a slight tendency to drowsiness. He was opened five hours after death; the heart was flaccid, and contained fluid and blackish blood. The lungs, which were for the most part of a rose colour, presented in each lobe eight or nine black spots, of the size at least of a lentil, and of half a line in thickness, formed by a dense substance, similar to the texture of the liver, and not at all crepitating; the remaining portions of the lungs contained air. There was found in the inferior lobe of the left lung, a patch about two inches in

length, and half an inch in breadth, of a livid colour; and from which, on being cut into, issued out a tolerable quantity of reddish serosity. The superior portion of the pia mater, corresponding to the anterior and posterior extremities of the right lobe (of the brain), was strongly injected with red in a circular space, the diameter of which was about four lines; it appeared black. The right ventricle contained a small quantity of reddish serosity, and the vessels running over it internally were of a bright red, and pretty strongly injected. There was no lesion of the left hemisphere.

The same experiment repeated on another robust dog, with five grains of the extract, furnished results somewhat different. Immediately after the injection, the head was forced forward, the limbs became stiff; at length drowsiness, convulsions, and paralysis of the posterior extremities quickly made their appearances. The next day, the animal appeared tranquil, and preserved a marked propensity to drowsiness; he refused food, and died five days afterwards. The brain presented *no apparent lesion;* the lungs were nearly in the same condition as in the preceding experiment.

In other instances we have witnessed dogs to recover perfectly, and without any assistance, after having experienced symptoms similar to those we have just mentioned, which had been produced by the injection of three or four grains of a watery extract into the jugular vein.

Observations.

1st. A young lady, twenty-two years of age, poisoned herself with Opium: the following symptoms were observed: perfect immobility and insensibility; countenance pale and cadaverous; pupils insensible to the impression of light; lower jaw fallen, and very moveable; muscles of the limbs and trunk in a state of relaxation; deglutition ceased; respiration for the most part scarcely perceptible; less heat of skin than in the natural state. Inhaling of ammonia, stimulant frictions,

blisters, antispasmodics internally, and stimulant glysters, were employed without any success. The patient vomited some liquid matter, which was blackish ; she only recovered her senses to fall again in a moment after into a state of stupidity ; and died about seventeen hours after having swallowed the Opium.

2nd. A lady, after several attacks of melancholy, for which a number of antispasmodic remedies had been employed in vain, swallowed one morning a drachm of crude Opium. Immediately, a propensity to coma ; sleepiness ; pulse at first small, almost imperceptible, afterwards full and slow ; respiration painful, sterterous ; sometimes intercepted, &c. When the patient was strongly shaken, she was roused for a few minutes from her lethargy, and information was then obtained respecting the manner in which she had proceeded with the poison ; but, in a short time she complained of having been awoke, wished for a speedy death, &c. : she turned towards the attendants ; eyes open, languishing, and dejected. In vain was tartarized antimony, and acidulated drinks administered to her, scalding the legs with boiling water was employed in vain, or frictions with an irritating ointment of cantharides, &c. ; she expired about eleven o'clock at night. (*Nouveaux Elemens de Thérapeutique de M. Alibert*, tom. ii. p. 61. 3rd edition ; observ. de *M. Leroux.*)

3rd. An aged nun of sixty-four was seized with the *senile gangrene* of two of the fingers of each hand, the consequence of chilblains. This patient reported that the sensibility of her fingers was so closely allied with that of the stomach, that when she suffered hunger, she lost the power of using them as the organs of touch. She suffered dreadfully, and Opium alone could procure her the enjoyment of sleep. It is not known at what hour of the night she took a composing julap, which had been entrusted to her in the evening for her own use ; but at break of day she crossed one of the wards of the Hospital of Saint Louis, for the purpose of satisfying some necessity. Scarcely had she returned to her bed than

she fell into a profound sleep; her breathing was intercepted, her countenance grew pale; the pulse was slow, eye-lids depressed, eyes motionless, pupils contracted; there was a distortion of the mouth, and a kind of rattling in the throat, similar to that which precedes death. In the evening, the symptoms the same: there was only a variation in the pulse, at one time full and free, at another small and frequent; the temporal arteries beat with a sort of throbbing. I ordered two glysters with cream of tartar, because deglutition was impossible. The patient passed the night in the same condition, and did not die till the next morning at five o'clock. On opening the body we found a fibrous concretion, abounding with filaments and dense, in the right ventricle, and which threw out a branch of three or four inches into each pulmonary artery. The opiated liquor was still in the stomach. (*Idem*, p. 60.)

4th. On the 6th of November last, about four in the afternoon, Mr. A. Cooper informed me, that he had just been to see a young man of about eighteen years of age, who, at ten in the morning, had swallowed about six ounces of laudanum, which remained in the stomach, and had produced symptoms which threatened a speedy death. Mr. Cooper, who only saw him five hours after the accident, informed me that he had given him, at half past three, a solution of a drachm and half of white vitriol (Sulphate of Zinc), which had produced some retchings, and caused him to vomit about an ounce and half of a fluid, which exhaled a strong smell of Opium. The state of lethargy had gradually increased; he had also fallen into a state of complete insensibility, and sinapisms had been applied without any remarkable effect.

Mr. Cooper having invited me to see this young man, in order to take such further means as circumstances might dictate, I went there at a few minutes after four. I found the patient on the floor, upon his knees, with the body bent forward, and supported by two of his friends, who, as I learned

shortly after, had formed the determination to replace him in the bed, and leave him to his fate, having no further hope from any medicines that might be employed. His head was resting on the sternum, his eyes closed, countenance pale; breathing slow and sonorous, as in a state of apoplexy; his hands were cold, and the pulse beat from ninety to ninety-six strokes in the minute, but in a weak and irregular manner. All his muscles were in a state of relaxation, and the flesh of his arms especially was extremely soft to the touch, and void of elasticity.

The blue vitriol, or sulphate of copper, was the first remedy that came into my mind for exciting vomiting; about half a drachm of this substance was immediately dissolved in water, and the patient being rudely lifted up, and strongly shaken, he opened his eyes, and seemed as if he wished to offer some resistance to the attempts which he perceived us to make. We continued however to pour down his throat about half the quantity of the vitriol, which was a dose equal to fifteen grains, which he swallowed with a degree of difficulty, such as might be supposed to exist just at the last gasp. Instantly his countenance, which had been for a moment animated, became more ghastly than ever. It was scarcely a minute after he had swallowed the whole dose, when he threw up on a sudden, a great quantity of a brownish fluid, which exhaled a strong smell of laudanum, which was immediately followed by two other similar vomitings, the whole of which might be estimated at two pints. He was then made to swallow some warm water, and removed briskly into another room, with the intention of opposing that state of numbness in which he was. His limbs, which at my first entrance were entirely deprived of motion, returned a little to their state of contraction, for he began to support himself on his legs with the assistance of the persons who were about him. He continued however to keep his eyes shut, unless when awoke by a brisk and sudden call; the pupils were dilated, the breathing apo-

plectic. I recommended strongly to his friends, who were extremely active, and very intelligent, to keep him as much as possible on the legs, and walk him continually about the room.

When I came again to see him, about nine in the evening, I found him sufficiently recovered to take that exercise with the assistance of one of his friends. His countenance appeared more natural, but he still answered only by monosyllables when pressed by questions, and that like a man in a state of extreme intoxication. He had vomited once or twice in the course of the afternoon, and gave me to understand that he felt a sensation of cold at the pit of the stomach, a remarkable heat on the surface of the body, and a marked coldness of the extremities. Notwithstanding the state of amelioration which we could perceive, his sleep was still profound, he snored strongly even when he was walking about the room; and when suddenly woke, he opened his eyes, and often fell again into his state of somnolency. Mr. Cooper came also to see him in the evening, and we both agreed to recommend that he should still be kept in the same state of forced activity during the night, and should be made to take repeated doses of assafœtida with the volatile alkali, camphor, and even musk, if the other stimulants did not appear sufficiently active. It was moreover agreed that a blister should be applied to the head, and sinapisms to the feet, and that tea and coffee should be frequently presented to him, as also lemon juice, of which he had taken some small doses during the evening with very great advantage. We recommended also that he should not be left, during the night, more than half an hour, without rousing him from his lethargy, in order to make him take some medicine, or some nourishing drink.

On seeing him the next morning, November 7th, I learned that at twelve o'clock, he had been so much better, that his friends deemed it unnecessary to apply the blister: a small

quantity of camphor julep with assafœtida was the only medicine that he had taken; but he frequently made use of tea, coffee, and lemon juice, which he took with great pleasure. He had likewise been prevented from sleeping, being kept incessantly in a state of constant agitation, till six in the morning, at which hour he returned to his bed.

I saw him in the morning; I found him still asleep; but on approaching him he awoke suddenly with a troubled appearance at first; but soon recovering himself, he said (which was correct) that he had slept, he believed, three or four hours. He complained of a painful sensation in the throat, as if it had been excoriated; he observed moreover that a glyster, which had been given him, had passed a little at a time with some excrementitious matter, without his being able to perceive it, or capable of preventing it.

The following day, November 8th, he was in a situation to walk out; his appetite was not yet returned, but yet he had not an aversion to food; he still complained of pains in the throat, and more so at the root of the tongue; pains which appeared evidently to be the result of the caustic medicines which had been given him. He had passed no stool since the accident, except what was produced by the glyster that had been given him; he was still pale and low; complaining of an uncomfortable sensation at the pit of the stomach, not however amounting to a pain; I ordered him a dose of rhubarb and calomel. He was shortly after perfectly restored. (*Transactions Medico-chirurgical*, trad. de l'Anglais, tom. i. p. 89. Observ. de *M. Marcet.*)

6th. Some young Cophts, says *Reaumur*, who sometimes were drinking together, wishing to cure the vanity of one amongst them, who piqued himself on being the stoutest drinker of the whole, contrived to dissolve, without his knowledge, a drachm of Opium in a glass of wine which he drank; they expected by that means to put him sooner to sleep and to make him appear the sooner conquered. A few hours after

having taken this drink, the young man was delirious, talked wildly, and at last fell into a profound sleep.

The next day his companions, who went to visit him in order to enjoy their false victory, were very much astonished to find him without pulse, livid, the mouth shut, in a word, dying. They sent out for a priest, who was also a physician, and who tormented the patient by the most violent remedies, for he died in very little more than fifteen hours after the accident. The body was covered with livid tumors on the arms and thighs, in the form of wens, as large as a child's head of four months (blood effused by the relaxing of the vessels and of the skin), and from which issued an intolerable stench, which attracted all the cats of the neighbourhood, that were eager to leap upon the body, and tear it to pieces with great avidity.*

7th. *Lassus* reports, that a woman died in consequence of having taken thirty-six grains of Opium. On opening the body, the stomach was found to be inflamed without erosion; the vessels of the brain were distended. *(Mémoire de l'Institut. Sciences Physiques et Mathématiques,* tom. ii. p. 107.)

8th. A patient was put to sleep, and died, in consequence of having taken a glyster into which four grains of Opium entered.† In another case, an opiated plaster applied to the temples has been seen to produce madness, and spasms in the mouth.‡

M. Nysten published in 1808 a very interesting work on Opium, from which we shall make an extract. This extract contains the conclusions from facts which precede it, and from a very great number of experiments made by this physiologist.

1st. The watery extract obtained with cold water, and which has undergone only one evaporation, is more active

* *Académie des Sciences,* vol. xxxviii. anno 1735.

† Gaubius *de Meth. concin. form. Lugd. Bat.* 1762.

‡ Monro *in Essays and Observat.* Phys. and Lit. vol. iii. p. 297.

than the other preparations of Opium, without excepting even the gummy extracts of Cornet, Béaumé, and Rousseau, prepared by repeated evaporations, by long digestion, or by fermentation.

2nd. The resinous matter, which is very little soluble, produces the same effects as the watery extract, but in a much stronger dose, and it does not inflame the mucous membrane of the stomach. If this membrane has sometimes been found in a state of phlogosis, after cases of poisoning by Opium, this phlogosis has been owing to the spirituous liquors in which the Opium has been taken, or to some other irritating substance administered as an antidote.*

3rd. The *Crystallizable essential salt*, improperly called the *Narcotic Principle*, is still less active than the resin. *M. Nysten* has taken four grains of it, and experienced only a very slight disposition to sleep.

4th. The pellicle, which separates during the evaporation of the extract, is less energetic still than the essential salt.

5th. The distilled water of Opium, strongly saturated with the aromatic principle, is capable of producing drunkenness and sleep, when taken in a strong dose. *M. Nysten* has swallowed two ounces of it without any sensible effect.†

6th. It is sufficient to inject three or four grains of the

* *Vicat* says: the resinous extract of Opium possesses very little activity; for fifteen grains of it did no harm to a dog, and *Charas* swallowed six grains without experiencing any thing but a degree of gaiety. (*Op. citat.* p. 220, anno 1776.)

† We have injected into the jugular vein of a small dog two ounces of this fluid: the animal did not appear to be incommoded. We have introduced into the stomach of another dog five ounces of the same fluid, obtained by the distillation of six ounces of water upon two of Opium: the œsophagus was tied. Ten hours afterwards, no perceptible phenomenon was observed. The next day, the animal was lying upon the side, in a state of great insensibility; the pupils were dilated, the limbs relaxed; he made some efforts to vomit, and died an hour after.

watery extract of Opium into the carotid of a dog, to kill him in the space of a few minutes.

7th. It requires a little stronger dose in order to produce the same effect, if injected into the crural or jugular vein. Nearly the same thing happens when the injection has been made into the pleura or peritonœum.

8th. The effects of Opium are always less speedy and energetic when it is injected into the cellular texture.*

9th. They take place all the same, when the watery extract has been injected into the bladder; but a great quantity will be necessary to determine death.

10th. The application of Opium to the brain is not mortal; although it is by acting especially on this organ, that Opium introduced internally, gives rise to dangerous symptoms.

11th. Opium does not destroy the contractility of those muscles with which it may be brought in contact, and the symptoms of poisoning which take place under these circumstances depend on its absorption and action upon the brain. A heart, plunged into a solution of Opium, continues to contract there for a very long time.

12th. The analogy which has been supposed to exist between the effects of Opium and those of wine is incorrect: Opium, whether in a small or great dose, directs its action to the vital properties, and it is even in this manner that it becomes a powerful sedative; wine, on the contrary, reanimates these properties; and when it even produces a debilita-

* We are of opinion that it may be added: "*a*. That they are still much less so when it has been introduced into the stomach; which probably depends, 1st, on its being partly digested and converted into a less pernicious substance; 2nd, on the venous absorption being less active. *b*. The effects of Opium are in general more decided when it is injected in glysters, than when it has been introduced into the stomach, at least, when the glyster has not been suddenly returned. Be it as it may, the injection of this medicine into the anus, is constantly followed by speedy and repeated vomitings.

ting effect, it is because they have been elevated to too high a degree of energy that they fall into a state of collapse.

13th. It is not by acting on the nervous extremities of the stomach that this poison produces death, as *With* has supposed; for animals, on which the section of the *par vagum* of both sides has been performed, die at the end of two or three hours, and after having experienced intoxication, somnolency, and convulsions, as we have described. (*Bulletin de la Société Philomatique*, Mai, 1808, tom. i. p. 143.)

872. It ought to be observed in the foregoing propositions, that *M. Nysten* confines himself to saying, when speaking of the immediate cause of death brought on by Opium, that *this medicine is absorbed, that it acts on the brain, and that it constantly directs its action to the vital properties.* But what is this mode of lesion?—Does Opium act by stupifying this organ? or does it begin by exciting it, in order afterwards to produce stupefaction?—In other words, is this medicine to be ranked among the narcotics, or amongst those which excite the nervous system?—This question, which has been long agitated among physiologists of very considerable merit, is very far from having received any satisfactory solution; this is sufficient to shew how many difficulties it presents; therefore neither do we pretend, in seeking to throw a light upon it, to investigate it thoroughly.

1st. *Balthasar Louis Tralles*, in a treatise entitled *Usus Opii salubris et noxius in Morborum Medela*, (in 4to. anno 1754) is the first who regarded Opium as a stimulant. Brown has since taken up this opinion, which he has consecrated by these words: *opium mehercle non sedat.* In fact, many physicians are of opinion at this day that this medicine is an excitant; it increases, say they, the movements of the heart, and consequently the circulation becomes more rapid; the arteries beat with greater force, the pulse is hard and full. Besides, the Turks, who take Opium pure, and in the form of extract, find in the use of it an oblivion of their calamities; a thousand

delicious images, a thousand agreeable visions present themselves to their imagination; they give themselves up to frantic and extravagant actions; roaring fits of laughter, mad proposals distinguish them; they feel a greater propensity to venereal enjoyments; all their passions, all their desires, are exalted; a warlike ardour animates their minds; they are prepared to brave death without fear—a valuable resource, which the officers of the Turkish armies know well how to turn to advantage; frequently too they abandon themselves to violent fits of madness; they murder, or stab all who make the least resistance to them. This state lasts several hours: then dejection and languor succeed. They become cold, melancholy, sad, stupid, and sleepy. Let us listen to the illustrious traveller *Chardin,* whilst recounting the effects of a certain drink prepared with the bulb and seeds of the poppy. "There is" says he, "a decoction of the head and seeds of the poppy, which they call *Coquenar;* for the sale of which there are taverns in every quarter of the town, similar to coffee-houses. It is extremely amusing to visit these houses, and to observe carefully those who resort there for the purpose of drinking it, both before they have taken the dose, before it begins to operate, and while it is operating. On entering the tavern, they are dejected, sad, and languishing; soon after they have taken two or three cups of this beverage, they are peevish, and as it were enraged; every thing displeases them; they find fault with every thing, and quarrel with one another; but, in the course of its operation, they make it up again, and each one giving himself up to his predominant passion, the lover speaks sweet things to his idol; another, half asleep, laughs in his sleeve; a third talks big, and blusters; a fourth tells ridiculous stories; in one word, a person would believe himself to be really in a madhouse. A kind of lethargy and stupidity succeed to this unequal and disorderly gaiety; but the Persians, far from treating it as it deserves, call it an extasy, and maintain that there is something supernatural and

heavenly in this state. As soon as the effect of the decoction diminishes, each one retires to his own house.

2nd. On another hand, some very respectable philosophers, at the head of whom we shall place the professor *Barbier* of Amiens, are of opinion, that all the phenomena produced by Opium, are the result of an influence essentially debilitating. This observer says: " In consequence of this debilitating action, the cutaneous capillary vessels fall into a state of atony, and lose their contractile and impulsive power; by which means it happens, that these vessels become distended by stagnant blood, which obstructs in its course that which is propelled by the heart, and which is consequently forced to accumulate in the arteries. It is also to this same cause, that is to say, to the detention of the blood in the capillary vessels, that we must ascribe the tumefaction of the face and eyes, the discoloration of the skin, and the increase of temperature observed after the ingestion of Opium. All those who die poisoned by Opium, are in a state of very decided erection; this phenomena is more particularly observable in Turks who have been killed in battle. This is moreover an erection purely passive, in which the vital properties have no concern, existing from a physical cause only. If Opium enlivens and increases the courage of the Orientals, it is because they live under a different climate; have other customs, other kind of habits, because they use this substance habitually; lastly, because they frequently do not take pure Opium, but a preparation in which the stimulant ingredients counter-balance at least the stupefiants." (BARBIER, *Pharmacologie Générale*, p. 490, an. 1816.)

3rd. *Mayer*, professor at Frankfort on the Oder, in a work entitled, *Considerations sur les Effets de l'Opium*, has looked upon the action of this substance under a point of view somewhat different. " In the dose of a quarter of a grain, or half a grain," says he, " Opium ceases to be stimulant, and may also be employed as a direct and immediate

sedative in *Hypersthenic* diseases, for instance, to quiet the erections in *blennorrhagia*. The same medicine exerts a specific stimulus on the nerves and on the system of the circulation, the energy of which it exalts, whilst at the same time it produces atony of the muscles, and obstructs or suspends the functions of the digestive organs. Hence it follows, that the calm produced by Opium has been erroneously attributed to an anterior excitement, which never takes place but when it has been exhibited in a large dose, and thus its effects may be compared to those of fatigue, and of an excess of food, which only induce quiet by an indirect debility.

873. Such are the principal opinions entertained to the present day, on the immediate effects of Opium. We are of opinion that they may be successfully confuted by means of the experiments which we have tried, and which lead us to the establishment of the following facts.

A. *Opium, employed in strong doses, ought not to be ranked either amongst the narcotics or the stimulants; it exerts a peculiar mode of action which cannot be designated exactly by any of the terms at this moment employed in the Materia Medica.*

In fact, all the animals submitted to the influence of a tolerably strong dose of this poison, are plunged, presently after, into a state of decided lethargy; their heads become heavy, they feel giddiness, their posterior extremities become weak, and are shortly after completely paralyzed (phenomena which declare a direct stupifying action). Twenty-five, thirty, or forty minutes after, the pulse is full, strong, frequently accelerated; convulsive movements take place; these movements, weak at first, become in a short time so violent, that the animals are suddenly lifted up from the ground, their head is strongly bent backward upon the spine; their extremities grow stiff by intervals, and are agitated; they utter frequently plaintive cries; (phenomena which declare a stimulant action). This excitement continues till the moment of death,

which takes place at the expiration of two, three, or four hours, and for the whole time of its continuance the symptoms of stupefaction, first produced, remain. The animals, far from being deeply sunk in sleep, are capable of being roused from their lethargy by a slight noise; by the least contact, or when any object whatever is brought near to their eyes: frequently also when shaken they grow extremely stiff, almost the same as if they had taken *nux vomica*.* How vastly different are these phenomena from those produced by Hellebore and Camphor. The former of these substances, which we consider as essentially *stupifying*, plunges the animals, shortly after its application, into a state of perfect lethargy; sensibility and the motive faculty appear to be annihilated to such a degree, as that life might be thought to be extinct three or four hours before death actually takes place, did not the phenomena of respiration shew the real state of things. (Vide pp. 2 and 3, article *Hellebore.)* *Camphor*, on the contrary, shews a decided excitement of the brain, from the moment of its application; anxiety, agitation, convulsions, contortions, and the most horrible grimaces of the face, are the primitive symptoms produced by it; to which, in a short time, succeed symptoms of relaxation and atony, which may be considered as the consequence of a prolonged excitement; besides, in cases of poisoning by this substance, the animals enjoy lucid intervals, and do not commonly die till after the third or fourth paroxysm.

B. *Opium, employed in a small dose, seems to confine its action to the production of those symptoms which we have pointed out as declaring themselves at first, such as announce stupefaction; sometimes however it produces a very consider-*

* The experiments we are speaking of were made by injecting thirty-six or forty grains of a watery extract of Opium into the cellular texture. We are of opinion, that this manner of operating is the most proper to illustrate the mode of action of poisons that are absorbed, and which might undergo some decomposition on the part of the digestive organs.

able excitement, which effects are the consequence of a peculiar idiosyncrasy.

C. *We cannot admit that there is any identity of action between Opium and spirituous liquors when employed in large doses.*

OF BLACK HENBANE (*HYOSCIAMUS NIGER*).

874. This plant belongs to the family of the *Solana* of Jus, and the Pentandria Monogynia of Lin.

Characters. Calyx tubular, consisting of five lobes; corolla monopetalous, tubular, with five unequal lobes; not much open, of a pale yellow towards the edges, and a blackish purple in the middle: five stamina; one style; flowers almost sessile, disposed on the branches in long spikes; capsule oblong, obtuse, bellying at its base, somewhat compressed; grooved with a furrow on each side, and opening horizontally towards the summit: the capsules succeeding to the flowers are all turned to the same side upon each of the spikes; embryo of the seed semicircular, placed on the edge of the perisperm. Stalk five decimetres in height, thick, cylindrical, branchy, and covered with a thick down. Leaves alternate, soft, cottony, very large, scolloped, and deeply indented on their edges. This plant grows by the road-side, and has a very disagreeable smell.

ACTION OF HENBANE ON THE ANIMAL ECONOMY.

Experiment 1st. A small dog was made to swallow two drachms of the dried leaves of Henbane, finely powdered: the animal did not appear incommoded. To another dog three ounces of the fresh root of black Henbane were given in small round slices, which had been gathered in the month of April: the œsophagus was tied. Forty hours after, the

animal had experienced no other phenomenon than dejection: the same state continued three days after the operation.

Experiment 2nd. On the same day (April 22nd,) another dog was made to take eight ounces of the juice proceeding from three pounds of the fresh root of black Henbane gathered in April, which had been pounded with two ounces of water, and one ounce of the contused root: the œsophagus was tied. Three hours afterwards, the animal was somewhat drowsy. At the end of two hours more, his posterior extremities were feeble, and bended with ease: the pupils were dilated, and the lethargy more decided; otherwise the animal experienced no giddiness or convulsions: he preserved the free use of his senses and motive faculty. The next morning, these symptoms appeared diminished; but he was slightly dejected: this state of things continued the whole day, and he died in the night.

Dissection, next day. No alteration in the digestive canal: the stomach contained a great portion of the root ingested: the lungs presented here and there livid spots, more dense than in the natural state, little crepitating, distended with blood, and with a fluid of a serous nature.

Experiment 3rd. On the 22d of April, six pounds of the fresh leaves and stalks of black Henbane were pounded, and twelve ounces of juice, which they furnished, were administered to a small robust dog; the œsophagus was then tied. Twenty-four hours after, the animal was walking about at his ease, and appeared only slightly dejected.

Experiment 4th. The 30th of June, at eight in the morning, a small robust dog was made to take two ounces of a decoction obtained by boiling an ounce and half of the root of black Henbane in three ounces of water; the œsophagus was tied. Half an hour after, the animal made efforts to vomit, and moaned. At ten, he was lying upon the side, in a state of great insensibility; he was raised up on his feet, and he instantly fell down like an inert mass; he shewed from time

to time some convulsive movements in different parts of his body; the organs of sense were no longer susceptible of impression; the breathing was deep and slow: these symptoms continued, and he died at half past ten. He was immediately opened; the heart was still contracting, and was distended by fluid blood, of a vermillion red colour, in the aortic cavities, and blackish in the pulmonary ventricle; the lungs were of a rose colour, and of their natural appearance; the digestive canal did not appear to exhibit the slightest alteration.

Experiment 5th. Two drachms of the watery extract of Henbane bought of an apothecary, were introduced into the stomach of a great dog: the œsophagus was then tied. The animal died eight days after, without experiencing any other symptoms than the dejection inseparable from the operation.

Experiment 6th. The same experiment was repeated upon a small dog, with seven drachms of the same extract. The animal died fifty hours after, without exhibiting any remarkable phenomenon. No lesion of texture could be discovered on dissection.

Experiment 7th. At six in the morning, six drachms of the watery extract of Henbane, bought of another apothecary, and dissolved in two ounces of water, were introduced into the stomach of a small dog: the œsophagus was then tied. Ten minutes afterwards, the animal made efforts to vomit, which he frequently repeated during a quarter of an hour. At twenty-five minutes after six, he uttered some plaintive cries; his breathing was deep. At three quarters past six, fresh moanings, perfect use of sense and movements, respiration very deep, and exceedingly accelerated. At seven o'clock, in the same state. At a quarter past eight he was found dead.

Dissection. The heart was no longer contracting, and was extremely hot; it contained in the left ventricle several clots, of a bright red colour; the right cavities contained some blackish clots; the lungs and digestive canal appeared sound.

Experiment 8th. A wound was made in the back of a small dog; three drachms of the aqueous extract of black Henbane, bought of the same apothecary, were brought in contact with the cellular texture, and the lips were brought together. The animal was dead four hours after. The dissection took place at the expiration of fifty minutes: the heart was extremely hot: it no longer contained fluid blood; in the right ventricle were seen a few small blackish clots.

Experiment 9th. At six minutes after eight, were applied to the cellular texture of the thigh of a robust dog of middle size, two drachms of a watery extract of Henbane, *prepared by evaporating in a water-bath the juice of the fresh root of black Henbane in full vegetation:* two drachms of water were added. At ten minutes before nine, the animal experienced some anxiety: he was agitated, and uttered plaintive cries: the pulse beat a hundred and fifty strokes in a minute. At nine, vomiting. At half past eleven, lying down on the side, continual moanings. At twelve, in a state of great insensibility, weakness of the posterior extremities. At one o'clock, death.

Dissection. The lungs were livid, dense, and distended with blood; there was no alteration in the digestive canal, nor in the limb operated on.

Experiment 10th. A wound was made on the back of a very strong mastiff dog; four drachms of the *resinous* extract of Henbane, bought of an apothecary, were brought in contact with the cellular texture: the lips were brought together by a few stitches. Two hours afterwards, the animal, who had exhibited no remarkable phenomenon, began to experience vertigoes. Ten minutes after, he staggered so much as not to make two steps without falling; his posterior extremities were extremely feeble, and he preserved the use of his senses; he was nearly in the same condition an hour after. The next morning, he appeared to be recovered; however, he still refused food. Four days after the operation, he kept

himself lying on the side, and would not take any food. He died in the night.

Dissection. The ventricles of the brain contained no fluid; the veins on the external surface of this organ were gorged and distended; the lungs, which were for the most part of a deep red colour, presented a few blackish spots; they were somewhat less crepitating than in their ordinary state; the wound was not much inflamed.

Experiment 11th. This experiment was repeated upon a small dog, and two drachms and a quarter only of the same extract bought at another shop, were applied upon the cellular texture of the thigh. The animal died at the end of seven days, without having exhibited any other symptom than dejection and loss of appetite. No lesion was discovered on opening the body.

Experiment 12th. At eight in the morning, twenty-eight grains of the aqueous extract of Henbane, bought of an apothecary, and dissolved in four drachms of water, were injected into the jugular vein of a small strong dog. Instantly the animal experienced slight vertigoes, he staggered for four or five minutes, then stopped; his posterior extremities became more and more feeble; he was drowsy; still he preserved the use of his senses. Twenty minutes after, seeing he was still in the same state, ten grains of the same poison dissolved in a drachm of water, were injected into the other jugular. In an instant, the animal appeared to be completely put to sleep; his posterior extremities were much more feeble; he lay down upon the belly, his four legs separated from one another, his head somewhat elevated, and inclined to the left side, without any convulsive movements; he was roused, and placed on his feet; he awoke, and remained so a few moments, then resumed his first attitude. The next day, he was very well, and ate a little. The day following, he was again attacked with vertigo, and died in the night, about sixty-eight hours after the injection. The lungs were somewhat

red, scattered over with a few small blackish spots; the brain exhibited nothing remarkable.

Experiment 13th. Forty-eight grains of the same extract, dissolved in six drachms of water, were injected into the jugular vein of a small dog. The injection was scarcely finished, when the animal was put to sleep; he had some slight convulsive motions of the extremities, and died. The body was not opened.

Experiment 15th. Eighteen grains of the resinous extract of Henbane suspended in two drachms of water, were injected into the jugular vein of a small dog. At the end of ten minutes the animal made efforts to vomit, and threw up some stringy matter mixed with bile. Twenty minutes after the injection, his posterior extremities grew feeble, his head was heavy, and he fell asleep without experiencing any vertigo. A quarter of an hour after, the lethargy was more decided; nevertheless, he could easily be awoke by making any noise. The next day, he was in excellent health. Forty-five grains of the same extract, suspended in half an ounce of water, were injected into the other jugular. The animal instantly separated and extended the hind feet; the head was reflected upon the back; there was a decided trembling of the muscles of the trunk. He died three minutes after. The body was instantly opened; the heart was no longer beating; the blood of both ventricles was all coagulated; that contained in the aortic cavity was of a vermillion red; the lungs were of a rose colour, and not much distended with blood; the digestive canal exhibited no sensible alteration.

Observations.

1st. *Baudouin* and *Laudet* ate on the 12th, at nine in the morning, some young shoots of black Henbane dressed with olive oil. In a short time the ground appeared to fly from under their feet; their countenance became stupid; their tongue was paralyzed, and their limbs became benumbed.

M. Choquet, physician of the hospital of Puerto Real near Cadiz, was called in the same day at two in the afternoon; and found them with their eyes hagard, the pupils very much dilated, their look fixed and dull, their breathing difficult, pulse small and intermitting: there were besides, *aphonia, trismus, risus sardonicus,* loss of sense, aberration in the functions of the intellect; which, together with disposition to sleep, placed these patients in a state of *typhomania;* the extremities were cold, the inferior ones paralyzed, the superior agitated by convulsive movements; to all these alarming symptoms was added also *carphologia.*

M. Choquet, after having conquered the contraction of the jaws, caused each of the patients to swallow the half of a solution of ten grains of Antimoniated Tartrate of Potash, in two pints of water. *Laudet* vomited a tolerably large quantity of fluid, in which it was easy to distinguish the parts of a plant altered by coction. The emetic water was continued, and purgative glysters were administered, which produced in *Laudet* vomitings, and abundant alvine discharges. The state of mania with delirium, but without fury, in which *Baudouin* was, rendered him by no means docile; he took considerably less of the emetic solution, and consequently had only very slight evacuations. To these means succeeded the administration of wine vinegar in large doses, dry frictions over the whole surface of the body, and particularly the abdomen. At ten in the evening, *Laudet* already experienced a sensible amelioration; his delirium had ceased, the difficulty of breathing was less, he was awake, had recovered a little of his natural warmth, sensation, and speech; the other symptoms had undergone but little diminution. The paralysis of *Baudouin* had also somewhat diminished, as well as his propensity to sleep; but the other symptoms appeared to be exasperated, and his madness was extreme; it was very difficult to hold him. M. Choquet continued the use of the vinegar, purgative glysters, and frictions, during the night of the 12th.

On the 13th, at seven in the morning, *Laudet* made use of his limbs with facility; his pulse was perfectly developed, and his bowels free, whilst he enjoyed all his intellectual faculties: he felt only a small degree of head-ache above the orbits, resulting from the bad disposition of his digestive organs: a strict low diet, and the use of lemonade, in a short time removed every complaint. *Baudouin,* who had attempted to run away during the night, was stopped by the guard of the hospital; and as he only could recollect himself confusedly, his delirium was continually running on assassination, desertion, bayonets, and court-martial: his pulse was very much accelerated, but more regular, and not so tight as on the 12th. His appearance was still fixed, his countenance hagard, and the abdomen was extremely hard and tense. Attributing the duration of these symptoms to the circumstance of the patient having had only very slight evacuations, sixty grains of a purgative powder were administered to him in the form of a bolus; this drastic, joined to purgative glysters, produced several stools. Towards noon, the pulse was considerably elevated, the breathing was become full, and a copious perspiration, which was soon succeeded by a looseness of the belly, terminated this useful secretion; in fine, at four in the evening, *Baudouin* was nearly as well as his comrade; he had equally regained the use of his faculties, speech, sensation, and motion. Two days of regimen, and the use of lemonade, sufficed at length to put these two soldiers into a situation to return to their duty.*

2nd. *Dr. Picard* says: "a glyster ordered for a lady, labouring under an ulcer of the womb, with the decoction of black Henbane, produced in a very short time the following symptoms: face extremely red, stiffness of the tongue, a state of numbness and loss of motion in the right arm, leg, and thigh of the same side; propensity to sleep, respiration

* Observation by M. Choquet, Doctor of Medicine, *Journal de Leroux et Corvisart, Avril,* 1813, p. 335.

hurried, great difficulty in the functions of hearing; in short, almost all the symptoms which characterize an attack of apoplexy, except the stertor and distortion of the mouth. These symptoms were combated with oxycrate, and the patient was perfectly restored."*

3rd. *Wepfer* relates, that several monks made a repast on the roots of wild endive, amongst which were mixed by mistake two roots of Henbane. A few hours after having gone to bed, some of them experienced vertigoes, others a burning of the tongue, lips, and throat; there were some who experienced severe pains in the iliac region, and in all the joints: the intellectual faculties and the organs of vision, were perverted in others; they could no longer read correctly, without adding some words; they gave themselves up to actions that were mad and ridiculous. He who had eaten the most, and who before saw extremely well, no longer distinguished objects without the assistance of spectacles: they were cured by the distilled water of Juniper-berries.†

4th. A man and his wife, deceived by the sweetness of the black Henbane root, ate some of it. They felt at first, a difficulty of swallowing, after which they became phrenetic and stupid; these symptoms disappeared spontaneously. *Lindern* has seen a similar imprudence followed by extravagant gestures, delirium, sleep with snoring, and in the end, death. (VICAT, Op. citat. p. 200).

5th. *Boerhaave* experienced a trembling and drunkenness, in consequence of preparing a plaster, into the composition of which entered Henbane.

6th. *Potovillat* asserts, that nine persons took some soup, in which had been boiled some black Henbane root instead of parsnips. Some of them lost their speech, and the whole were agitated by convulsive movements; they experienced dis-

* *Traité de Médecine Légale*, already quoted, tom. iv. p. 25, 2nd Edition.

† WEPFER, *Cicutæ Aquaticæ Historia et Noxæ*, p. 232.

tortion of the mouth and of the limbs, *risus sardonicus*, and a horrible madness. When they were restored by appropriate remedies, they saw objects at the first moments double, then they appeared to them of a scarlet colour.*

7th. *Grunwald* has seen the decoction of the leaves of this plant, administered in a glyster, give rise to a furious delirium.† Several practitioners have remarked symptoms of poisoning after the administration of a glyster prepared with the extract of this plant.

875. It results from the facts delivered:

1st. That the juice and decoction of the root of black Henbane in full vegetation, produce serious symptoms when introduced into the stomach; but that their effects are less if employed in the beginning of the spring.

2nd. That the juice of the leaves is less active.

3rd. That the watery extract obtained by evaporating in a water-bath the juice of the fresh plant in full vegetation, possesses nearly the same poisonous properties as the juice, whilst it is incomparably less active when obtained by decoction of the plant not sufficiently developed, or too much dried, which explains why *certain extracts of Henbane found in commerce are endued with no virtue.*

4th. That these preparations act nearly in the same manner, whether applied upon the cellular texture, introduced into the stomach, or, in fine, injected into the veins: in this last case it requires but a very small quantity to produce death.

5th. That they are absorbed, carried into the circulation, and exert a remarkable action on the nervous system, which may be compared to a mental alienation, to which succeeds a remarkable stupefaction.

6th. That they do not produce inflammation of the texture.

7th. Lastly, that they appear to act in the same manner on the human species as on dogs.

* Philosophical Transactions, vol. xl. p. 446.

† GRUNWALD, *Ephemer. des Cur. de la Nat.* an. 9, App. p. 179.

876. The white Henbane *(Hyosciamus albus)* is likewise extremely poisonous.

OBSERVATIONS.

1st. When taken in the dose of twenty-five grains, it has produced lethargy, convulsions, *subsultus tendinum,* and insensibility; in another instance, its use destroyed the faculty of deglutition, produced delirium, and suppressed the voice: symptoms which, indeed, were not of long duration.*

2nd. The following fact was communicated to M. Fodéré, professor of the School of Medicine of Strasbourg, by Dr. Picard.

" In the month of April, 1792, a large quantity of Henbane was carried by mistake on board the French Corvette, *La Sardine,* which the sailors had gathered in one of the islands of Sapienzi in the Morea, where the vessel chanced to be. A part of it was put into the ship's coppers, and the remainder into those of some of the subaltern officers. At four o'clock they all dined. In a short time they experienced vertigoes, vomitings, convulsions, gripes, and copious stools; which, as they seized the whole ship's company, determined them to fire a gun, and make all the necessary signals for calling on board the absent boats. M. Picard arrived on board, and perceived the second gunner Ribergue, making a thousand grimaces and contortions, very much resembling the *Danse de Saint-Guy.* He ordered the plant to be brought to him, which had been employed, and recognized the *white Henbane.* He kept up the evacuations upwards and downwards, and used afterwards drinks with vinegar. Those who had no evacuations were for some time in a sickly condition, and struggled with a protracted convalescence; the others quickly recovered. It was necessary however to combine the most powerful anti-spasmodics with the evacuating plan, in order to restore *Ribergue* to perfect health." *(Médecine Légale,* already quoted, tom. iv. p. 23.)

* HAMILTON, *Essays and Observations,* p. 243.

877. Golden Henbane (*Hyosciamus aureus*). *M. de Voilemont* has given the decoction of this root to dogs. "There comes on them," says he, "a trembling, and feebleness in the legs; old dogs are five or six days without eating or drinking, and in the end die. Young ones, on the contrary, drink excessively, eat scarcely any thing, and at the end of eight or ten days are in good health.

The *Hyosciamus Physaloides* and *Scopolia*, are equally poisonous.

OF THE PRUSSIC ACID.

878. The Prussic Acid, in the most concentrated form that it has hitherto been obtained, is a fluid colourless, transparent, and of an exceedingly strong smell, similar to that of the blossom of the peach, or bitter almond trees; its taste, which is at first cool, becomes acrid, irritating, and excites coughing; its specific gravity at 7°. is as 0,70583; it scarcely reddens the tincture of tournesol; exposed to the action of caloric, it boils at 26°5; it is capable of congealing at 15° below 0; the crystallization of this acid in its concentrated form may even take place when a few drops of it are poured upon paper; in this case, it becomes in part volatile, absorbs caloric from the portion not volatilized, which by that means becomes congealed.* It inflames in the atmosphere on approaching a body in a state of combustion; it is little soluble in water; is easily dissolved by alcohol; it gives with the Nitrate of Silver a white precipitate. Combined with Potash and Oxyde of iron, it furnishes a double salt of a lemon

* Several of these properties were not ascertained by the illustrious chemist *Scheele*, the discoverer of this acid. They will be found described at length in a very excellent Memoir of *M. Guy-Lussac*, who first succeeded in depriving the Prussic Acid of a very great quantity of the water with which it was combined, when prepared according to the process of *Scheele* (Vide *Annales de Chimie*, tom. lxxvii, p. 128.)

colour, which dissolves in water, and the solution of which throws down in a blue precipitate, more or less deep, the salts of iron of the second and third degree of oxydation; in a crimson, inclining to brown, the salts of copper at maximum; in a blood colour the salts of Urania; and in an apple-green those of Nickel.

ACTION OF THE PRUSSIC ACID UPON THE ANIMAL ECONOMY.*

Experiment 1st. A small bitch was made to swallow two drops of Prussic Acid. Immediately after, her breathing became accelerated, she staggered, fell, passed abundance of urine, and vomited twice; in a short time after, she was restored to health. Five hours afterwards, she was made to take eight drops; and the animal in a short time experienced the following symptoms: cough, salivation, accelerated respiration, staggering; weakness of the posterior extremities, plaintive cries, alvine evacuations, falling down, opisthotonos, dilatation of the pupil, tetanic stiffness, and, in less than five minutes, paralysis, first of the posterior limbs, then of the anterior; general insensibility, except in the tail, which was agitated from time to time; pulse accelerated, from seventy-two to a hundred and fifty pulsations per minute; great mobility of the eyes and eye-lids; at length, sleep. Fifteen minutes after, the animal rose up, passed some urine, experienced an opisthotonos, and in half an hour was recovered. The next morning the animal was again made to swallow sixteen drops of the same poison. Instantly, respiration accelerated, very strong cries, convulsions, opisthotonos, then emprosthotonos; its fore paws placed above the head, general tetanus, pupils dilated, ears cold, urine copious, general paralysis, tongue hang-

* These experiments were made with Prussic Acid, prepared according to the process of *Scheele*, and consequently containing a great deal of water.

ing out, eyes fixed, eye-lids moving. Five or six minutes after, respiration difficult, trismus, *subsultus tendinum*. At the end of half an hour, she rose up, and appeared to suffer pain in the belly; was frightened at the least noise, sought dark places, and was all in a tremor. An hour after, she ate with voracity.

Experiment 2nd. When thirty or forty drops of Prussic Acid are administered to dogs or to cats; they utter cries more or less strong, are agitated by convulsive movements, and die six, twelve, or fifteen minutes after the ingestion of the poisonous substance. On opening the bodies, no lesion is discovered in the digestive canal; the right ventricle of the heart is still contracting at the end of twenty or five and twenty minutes, whilst the left no longer exercises any motion; the veins contained in the thorax and abdomen, liver, kidneys, right auricle and ventricle of the heart, are distended with blood; the whole arterial system is empty; the lungs are more or less spotted; the brain appears in its natural state; sometimes it is somewhat softer, and the vessels of its base rather distended; the muscles are pale, and irritable for some time by Galvanism.

Experiment 3rd. Twenty-seven drops of this acid, being injected into the anus of a small cat, produced some vomitings and convulsions; this last symptom was more intense when twenty-seven drops of the same poison were injected into the abdomen; vomitings and convulsions were likewise produced by its injection into the synovial capsule of the knee, and into the vagina.

Experiment 4th. The Prussic Acid, brought in contact with the *dura mater*, or with the nerves of the arm, produced no serious symptom; the same took place at the tarsal articulation of a cat, strongly secured above the knee, and plunged for some time into this acid.

Experiment 5th. Twenty drops of Prussic Acid intro-

duced into the stomach of a rabbit, killed it in three minutes. These animals die still more speedily when a few drops of this poison are injected into the jugular vein. After death, the heart and auricles were found insensible to the concentrated acids and to puncture; the muscles of the breast were trembling when cut; the stomach exhaled the odour of the Prussic Acid; the intestines preserved their peristaltic motion; the blood was fluid.

Experiment 6th. Sparrows expire within one, two, four, or five minutes, amidst convulsions more or less violent, when a single drop of this acid is injected into their beak, or introduced into the anus. It is sufficient even to hold the animal over the mouth of the bottle which contains the acid.* A duck was killed speedily with fifteen drops.†

Experiment 7th. Frogs die within one or two hours after having swallowed fifteen, eighteen, or twenty drops of Prussic Acid: a short time after the ingestion of this poison, they lose insensibly their strength, shut their eyes, lay down their heads upon the floor. A little before death, they swell, extend, and move their phalanges, contract their posterior extremities, and become insensible. On dissection, a great quantity of reddish serosity was found in the abdomen, a tolerable quantity also of a white viscous fluid in the mouth and in the stomach, a little air in the lungs; the heart continued to beat more than two hours, notwithstanding the repeated application of the Prussic Acid upon it. The contractions of this organ cease altogether at the expiration of half an hour, when it is separated from the trunk, and plunged, three times, into the Prussic Acid. *(Coullon.)* This

* Schrader, *Journal Allemand par M. M. Yellen et Promsdorff*, second extract, vol. xxi, 1st. number, 1st. letter.

† Coullon, D. M. P. *Dissertation Inaugurale sur l'Acide Prussique*. Aug. 20th, 1808. This thesis contains a very great number of interesting facts.

fact agrees with the experiments of the celebrated Fontana,* in which the heart of several frogs ceased to contract when a few drops of the cherry laurel were let fall upon them.

These animals die also when the Prussic Acid is applied upon their eyes, or injected into the anus, or into the abdomen.

Experiment 8th. A carp was made to swallow twenty-four drops of Prussic Acid; sensibility was extinguished imperceptibly, and the animal died at the end of an hour. The mouth remained open; the heart contracted immediately after death; but the auricle gave no sign of motion. A pike, placed in water containing a few drops of Prussic Acid, died in an hour and half; he agitated himself greatly in the water. *(Coullon.)*

Experiment 9th. Snails, *helices aquaticæ,* and slugs, die from the contact with the Prussic Acid; but death takes place later in some other animals. Leeches, earth-worms, crabs, lobsters, scolopendræ, spiders, lice, fleas, flies, bugs, (both of the beds, and such as are found in woods) bees, wasps, ants, crickets, grass-hoppers, vibriones, equally lose their lives at the end of a space of time which is variable, when brought in contact with this poisonous substance, and exhibit symptoms more or less similar to those we have been describing. *(Coullon.)*

Experiment 10th. Professor *Emmert,* who had published, as early as 1805, an excellent treatise on the effects of the Prussic Acid, asserts, that a crow died a few seconds after the injection of half a drachm of this acid into the trachea; it exhibited all the phenomena of opisthotonos.†

Experiment 11th. The same physiologist injected into the jugular vein of a horse some warm Prussic Acid, and he remarked that, a few minutes after, the breathing was more

* *Traité du Poison de la Vipère.*

† *Dissertatio Inaug. Med. de Venenatis Acidi Borussici in Animalia Effectibus.* C. F. Emmert, *Tubingæ,* 1805.

frequent, convulsive movements took place in all the muscles of the body, and the pupil was dilated. The animal died twenty-one minutes after the injection. The blood drawn from the animal after the injection coagulated without producing any crust, whilst that drawn before the operation had one; there were bubbles of air in the heart.

Experiment 12th. *M. Robert* has exposed successively birds, rabbits, cats, and dogs, to the aperture of a matrass of the capacity of two *litres*, containing air mixed with Prussic Acid Gas; all these animals died in the course of two, four, six, eight, or ten seconds, opening their jaws, and rendering a great quantity of saliva. A very strong dog, submitted to one of these experiments, presented after death, the following results: brain sound, exhaling the odour of Prussic Acid; tongue soft, bluish, and hanging out of the mouth; bloody mucosities in the ventricles of the larynx; mucous membrane of the trachea scattered over with reddish streaks; the capillary system was injected; lungs of a bright red; aortic cavities of the heart filled with blood of a deep red colour; that contained in the aorta and its principal divisions was also of the same colour; the venous blood had the appearance of a fluid in which some liver had been dissolved; the lungs, heart, and blood, exhaled the odour of Prussic Acid; the same phenomena appeared in the liver and muscular flesh; no alteration in the abdominal organs.

Experiment 13th. *M. Robert* has also caused dogs and cats to swallow Prussic Acid dissolved in water and in alcohol, and obtained results similar to those we have described in the foregoing experiments.*

Observations.

1st. *M. Coullon* says, page 39, "I have swallowed successively twenty, thirty, forty, fifty, sixty, eighty, and eighty-

* *Annales de Chimie*, month of October, 1814.

six drops of Prussic Acid in as much water. I found this liquor of an intolerable bitterness. I felt nothing at the first doses; it was only at the last that I observed what follows; after taking them, I had instantly, for a few minutes, an increased secretion of saliva, and two or three slight retchings; my pulse, which before this was beating fifty-seven or fifty-eight pulsations per minute, gave very sensibly, at the end of ten minutes, seventy-seven and seventy-eight; but in the course of an hour and a half it returned to its former standard. I felt, during a few minutes, a heaviness of the head, and slight cephalalgia, which appeared to be seated under the hairy scalp of the sinciput. For more than six hours, I experienced a very remarkable anxiety of the præcordia, alternating with a slight pulsative pain in this part, which was not rendered more sensible by pressure."

2nd. My friend *M. Fueter* communicated to me the following fact, which has since been inserted in the *Annales de Chimie* of the month of October, 1814. M. B., Professor of Chemistry, left from forgetfulness a flask containing alcohol saturated with Prussic Acid; the servant girl, seduced by the agreeable smell of the liquor, swallowed a small glass of it. At the expiration of two minutes, she fell dead, as if she had been struck with apoplexy. The body was not opened.

3rd. *Scharinger*, Professor at Vienna, prepared, six or seven months since, some Prussic Acid pure and concentrated; he diffused a certain quantity of it upon his naked arm, and died a short time after.

OF THE LAUREL (*PRUNUS LAURO-CERASUS* OF LIN. OR BETTER *CERASUS LAURO-CERASUS*).

879. This shrub belongs to the genus *cherry-tree* of the family of the *Rosaceæ* of Jussieu.

Calyx bell-shaped, caducous, with five lobes: corolla of

five petals: fruit fleshy, round, smooth, somewhat furrowed on one side; stamina of indeterminate number; flowers in a pyramid, white, but not very bright: bark smooth, of a greenish brown colour: leaves permanent, simple, entire, oblong, firm, shining, petiolated, sometimes variegated with white, sometimes with yellow, furnished with two glands on the back, or on their inferior surface. This shrub grows spontaneously near the Black Sea, in the neighbourhood of Trebisonde. It is cultivated in gardens; its flowers and leaves have the flavour of the bitter almond.

ACTION OF THE DISTILLED WATER OF THE LAUREL ON THE ANIMAL ECONOMY.

The distilled water of the Laurel contains Prussic Acid. *Schrader* has witnessed *(memoir already quoted)* that in pouring it upon a ferruginous salt, a blue precipitate of Prussiate of iron was obtained by the addition of a few drops of an alkali, and of any acid except the Nitric or the Nitro-muriatic. *Bohn, Bucholz, Roloff,* and *Gehlen,* have also recognized in it the presence of this acid.

*Madden,** *Mortimer,*† *Browne-Langrish,*‡ *Nicholls,*§ *Stenzelius, Heberden, Watson, Vater,*‖ *Rattrai,* the *Abbé Rozier, Duhamel,*¶ and *Fontana,*** have successively made experiments on the deleterious properties of this fluid. We have also tried ourselves a very great number: the following are the principal results.

Experiment 1st. A wound was made in the back of a little dog; an ounce and half of distilled Laurel-water, were

* Letter in the Philosophical Transactions, an. 1713.

† Idem.

‡ BROWNE-LANGRISH, *Expériences de Médecine sur les Animaux.*

§ Vid. *Œuvres Physiques et Médicales de* R. MEAD, article *Opium.*

‖ *Dissertatio de Lauro-cerasi.*

¶ *Traité des Arbres et des Arbustes.*

** *Traité du Poison de la Vipère.*

injected into the cellular texture. At the end of half an hour the animal vomited a tolerably large quantity of alimentary matter. Three minutes after, he threw up by the mouth some greenish, glutinous, and frothy matter. Thirty-five minutes after the operation, he made several circular turns in the laboratory; his head seemed to be heavy; his extremities grew feeble, first the posterior, then the anterior ones; he could scarcely support himself. Five minutes more had scarcely elapsed when he fell down upon the side, reversed his head upon his back, and his paws were agitated with slight convulsive motions: he might be moved like an inert mass of matter, and was incapable of standing; his breathing was difficult and accelerated; he preserved the use of his senses. Ten minutes afterwards he uttered very acute plaintive cries. These symptoms continued till death, which took place an hour and half after the application of the poisonous substance. Sensibility had diminished by degrees in the organs of sight and hearing.

Dissection. The vessels of the superior surface of the brain were black, very much distended, and gorged with blood; there was no fluid in the ventricles of this organ; the lungs were more red than in their natural state; the digestive canal presented no sensible sign of alteration.

The same experiment repeated upon a stronger dog furnished the same results.

Experiment 2nd. *Fontana* opened the skin of the abdomen of a large rabbit; he slightly wounded the muscles, into which he introduced about two or three tea-spoonfuls of this water. In less than three minutes the animal fell into convulsions, and soon after died. (Op. citat. p. 127.)

Experiment 3rd. Four ounces of this fluid were injected into the stomach of a very strong dog, and the œsophagus was tied. At the end of three minutes, vertigoes, staggering, weakness of the posterior extremities, falling upon the side, and reversing the head upon the back; free use of the senses;

a moment after he made an effort to stand on his feet, stood up for two minutes, walked, staggered, and fell again; then the breathing became accelerated, the head projected forwards; the limbs were agitated with convulsive movements; the animal made no resistance; on the contrary, was in a state of insensibility; the senses no longer performed their functions. Four minutes after the attack, he lay down upon the back, separated the hind legs, which were greatly elongated, breathed with difficulty; the pulsations of the heart regular and frequent, the tongue rose-coloured, the head in the natural position; the convulsive movements continued to be very slight; the agitation and the shock produced no tetanic stiffness; the tail was trembling. Eighteen minutes after the ingestion of the poison, the animal appeared to be dead; he was motionless. He expired in this state, at the end of six minutes. The body was immediately opened. The blood contained in the left ventricle was red; it was fluid in all the vessels, and in all the cavities; the lungs were rose-coloured, crepitating, and not distended with blood; the digestive canal was sound; some food was found in the stomach; the ventricles of the brain contained neither serosity nor blood; the internal vessels of this organ were injected.

Madden relates three experiments in which the dogs took the same poison, the œsophagus not having been tied; and the same symptoms were observed as those we have described above; two of these animals vomited, and one of them recovered after having had convulsions for ten minutes.

Experiment 4th. When injected into the rectum in the dose of one or two ounces, this fluid produces the same symptoms, and death supervenes ten, twelve, or fifteen minutes after. *Madden* has however observed, that, in this case, there were violent convulsions, more especially in the muscles of the neck and spine, tetanus of the extremities, and foaming at the mouth. *Mortimer*, Secretary of the Royal Society of London, reports that, in some of the experiments made with

this poison, the rectum and liver have been found inflamed, and the latter of these organs was almost livid; the lungs were shrivelled, red, and inflamed. Sometimes also about a spoonful of water has been found in the pericardium.

Experiment 5th. *Browne-Langrish* gave to a dog labouring under a fistula a chopine of water distilled from laurel leaves; the animal instantly experienced the phenomena above described, and the discharge from the fistula was suppressed. The next day he was made to swallow the same dose of the poison; the same symptoms took place, with a copious sweating in the beginning. The experiments were suspended for three days, and the running re-appeared; on the fifth day, three chopines of the fluid were given him, and he died in four minutes and a half.

Experiment 6th. *Fontana* caused some eels to swallow some distilled water of laurel; immediately after, these animals contracted themselves; then remained motionless and insensible to every mechanical agent; the heart still beat a little, and ceased to contract sooner than when the head is cut off; lastly, they died in a few seconds.*

Experiment 7th. Three drachms of this fluid were injected into the jugular vein of a strong dog; the injection was scarcely terminated, when the animal fell down on his side; the head was reflected upon the back, and the extremities agitated by slight convulsive movements; the mouth was foaming; respiration impeded, and accelerated; the organs of sense were insensible. At the expiration of four minutes, he attempted to rise, but fell down again; the head then was in its natural position: at one time the animal brought it a little forward upon the thorax, at another reflected slightly towards the back; the muscles of the face and eyelids presented at intervals convulsive movements not very severe. Ten minutes after, the breathing was again accelerated and rendered difficult,

* Fontana, Op. citat. p. 128.

the tongue red, the conjunctiva injected, the organs of sense began to recover their sensibility. At the end of five minutes, the animal appeared in a profound sleep; he was placed on his feet; he bent them in lying down on the belly; his head trembled greatly, he moved it about from side to side, and endeavoured to raise it up a little; but it was heavy and fell down: the animal then lay down upon his side; there were no more convulsions in the limbs; the organs of sense had recovered their sensibility. Twenty minutes after the injection, most of the symptoms had decreased in violence; the animal was capable of standing and walking; he staggered however a little, the trembling of the head had disappeared; respiration was performed as in health: in fine, a quarter of an hour after, he preserved only a very slight tendency to drowsiness; at the end of two days he ate heartily. The day after, he was perfectly recovered.

Experiment 8th. Three drachms and a half of the same fluid were injected into the jugular vein of a small strong dog, the animal instantly appeared stupified, to that degree that he was considered dead: the pulsations of the heart were rare, respiration almost suspended. He expired two minutes afterwards. The body was instantly opened. The blood contained in the left ventricle was fluid, and of a less bright red colour than in its natural state; the lungs were rose-coloured and crepitating.

These two experiments, the correctness of which we can vouch for, do not agree with those of the celebrated Fontana, who says, that he observed no deleterious effect from injecting into the jugular of two rabbits, a good tea-spoonful of this poisonous substance. (Op. citat. p. 131.)

Experiment 9th. *Browne-Langrish* injected four ounces of the same fluid into the abdomen of a dog; the animal experienced the symptoms described above; and died twenty-two minutes after.

Experiment 10th. *Fontana* laid bare the sciatic nerve of a

large rabbit; he wounded it with a lancet, and covered the whole extent that had been wounded with lint, moistened with fifteen drops of distilled laurel-water; he afterwards so disposed the parts that the poisonous substance could not communicate itself to any thing in the neighbourhood of it; the wound was then brought together by suture, and the animal did not appear in any way incommoded. (p. 129.)

OBSERVATIONS.

1st. " A woman, after making a quantity of Laurel-water, gave a bottle of it to *Martha Boyce*, her servant, who carried it to *Anne Boyce* her mother, as an excellent cordial. This latter made a present of it to *F. Eaton*, who gave two ounces of it to regale *Mary Whaley*, who only drank two thirds of it, then went away: *F. Eaton* drank the rest. The former, going into a shop, complained of a violent pain of the stomach; she was carried home, and from that moment lost the use of her speech, and died in an hour and a half, without vomiting, convulsions, evacuations, or any external change. *A. Boyce*, when informed of this accident, would not believe it; and, to prove that it was an excellent cordial, she poured out into a glass three spoonfuls, which she drank, and a few minutes after swallowed two more, so much was she persuaded of its virtue; but she died in a very short time without making the least complaint, and without convulsions. *F. Eaton*, who had taken but little of it, escaped death by an emetic."*

2nd. *Douellan* gave to a relation, whose heir he was, a medicine containing Laurel-water: the unfortunate patient experienced convulsions, foamed at the mouth, had the jaws locked, and the eyes fixed: he expired an hour after.†

3rd. *M. Fodéré* says: " whilst I was attending my studies at Turin, in 1784, the chamber-maid, and man-servant of a

* *Philosophical Transactions*, year 1731. Letter of Madden.

† *London Chronicle*, 1718. No. 3,797.

noble family of that town, stole, for the purpose of regaling themselves, from their master, a bottle of distilled Laurel-water, which they took for an excellent cordial, which was kept locked up for the sake of preserving it. Fearful of being surprized, they hastily swallowed, one after the other, several mouthfuls of it; but they paid in a short time the price of their dishonesty, for they expired almost instantly in convulsions. The dead bodies having been carried to the University, they were examined; the stomach was found slightly inflamed, and the rest in a sound state."*

4th. In 1728, two women having taken of this fluid, one to the dose of ten drachms in an hour's time, the other of two table-spoonfuls, the first lost the use of speech, experienced a painful sensation in the stomach, and expired without vomitings, stools, or convulsions; the second sat down on a chair, and died immediately after, without convulsions, or any other apparent commotion.

A young man died in a few minutes after having drank a part of the distilled Laurel-water contained in a phial: he experienced a severe affection of the stomach.†

OF THE OIL OF LAUREL.‡

Experiment. A drachm of this oil was mixed with six pounds of common water; the whole was shaken up together, and two ounces of the mixture were administered to a dog; the animal was paralyzed to that degree, that he was no longer sensible of the irritation of any agent whatever. He died in half a minute.§

* *Médecine Légale*, already quoted, tom. iv. p. 27, 2nd edition.

† MURRAY, *Apparatus Medic.* tom. iii. p. 213.

‡ This oil had been prepared by drawing over again and again, three or four times, the distilled water upon fresh leaves.

§ NICHOLLS. Vide *the Medical Works of Richard Mead, Laurel-water*, p. 139. anno 1765.

Duhamel relates, *(Traité des Arbres et Arbustes de la France)* that he was near being suffocated by the strong smell of bitter almonds, which escaped on opening the body of a dog killed by this poison.

Fontana prepared an oil by distilling the leaves of the Laurel in vessels of glass without the addition of water. He administered two, three, and four drops of it to rabbits, tortoises, pigeons, and frogs, which died in a very short time after, and which exhibited symptoms similar to those we have been describing.

OF THE WATERY EXTRACT OF LAUREL.

Experiment 1st. A wound was made in the inside of the thigh of a dog: a drachm of this extract was injected into the cellular texture. Ten days after, the animal was living, and had felt no other symptom than loss of appetite.

Experiment 2nd. The same experiment was repeated upon a small dog, with two drachms and a half of the same extract. Four and twenty hours after, the animal had experienced nothing; he walked about extremely well; he was nevertheless somewhat dejected. He died forty-eight hours after the operation. The heart, lungs, and digestive canal appeared sound; the wound was very little inflamed.

Fontana administered about thirty grains of this extract to a guinea-pig and a rabbit: they were not incommoded by it. Fifteen grains administered to several pigeons were also without effect. (Op. citat. p. 155.)

ACTION OF BITTER ALMONDS ON THE ANIMAL ECONOMY.

Experiment 1st. A cat, two months old, swallowed a drachm of bitter almonds pounded. In a short time after, it dragged along its hind legs, became paralytic, and experienced

four attacks of epilepsy. In the evening, the respiration became panting, and it died. The stomach was red at its orifices, and contained mucus: the heart and auricles were filled with fluid blood; there was an effusion of blood throughout all the right side.

Experiment 2nd. Some pigeons were made to take somewhat less than a drachm of bitter almonds pounded; they walked about for a few minutes; but in a short time their crop and their neck swelled out, their feathers became erect, at length they fell down as if epileptic; their heads were reflected upon the back; they remained motionless, and senseless, and soon expired. The œsophagus was found somewhat inflamed, very much dilated, and full of mucus; the duodenum contained chyle, viscid and yellow; the blood in the subaxillary vessels was fluid, and of a vermillion colour; the cerebellum was distended with blood; the lungs appeared sound. (WEPFER, *De Cicuta Aquatica*, pp. 239 and 241.)

These experiments have been successfully repeated by *M. Gerard*, professor of the *Ecole Centrale* of the Lozère.

Foxes, squirrels, cocks, fowls, cranes, ducks, canary-birds, weazels, are killed by these almonds, according to the facts reported by *Dioscorides, Foenisius, Matthiolus*, and *Tabernæmontanus, Vicat, M. Deyeux*, &c. &c.

Experiment 3rd. Twenty bitter almonds were introduced at noon into the stomach of a small robust dog, each of them cut into three pieces: the œsophagus was then tied. At the end of an hour and half, the animal began to experience vertigoes, and weakness of the posterior extremities. He died at six in the evening. The *Dissection* took place an hour after. The animal was still warm; the heart no longer contracted, and contained a very small quantity of blood; the lungs were grayish, the stomach, which was sound, contained the fragments of the almonds, and exhaled a strong smell of Prussic Acid, whilst, before the ingestion, these seeds were devoid of smell; the duodenum was lined with a substance

similar, for its texture and colour, to the yellow matter of the bile; no lesion was perceived in the digestive canal.

Experiment 4th. A small dog was made to swallow six bitter almonds which had been coarsely pounded. At the expiration of an hour, he vomited them, and was perfectly recovered. The next day, the same experiment was repeated with the same number divided each of them into two portions, and the œsophagus was tied. Four hours after, the animal had experienced nothing. He did not die till the end of the fourth day, and then in a state of great dejection. The body was not opened.

Experiment 5th. Six bitter almonds grossly powdered were applied to the cellular texture of the thigh of a dog of middle size. Thirty hours after, the animal did not exhibit any remarkable symptom, and he did not die till the end of the fourth day.

880. Every thing tends to induce a belief that the leaves of the peach-tree, fruits with kernels, the pips of apples, and the different bodies containing Prussic Acid, exert on the animal economy, a deleterious action more or less considerable.

881. It results from these facts:

1st. That the Prussic Acid is hurtful to the different classes of animals, more to those which have warm blood, than to the others; insects however die approaching to animals with warm blood by the promptitude with which they are frequently seized; but receding from them by the inverse order in which the parts die.

2nd. That it produces death so much the more rapidly as the circulation is more active, and as the organs of respiration are of greater extent.

3rd. That it is more pernicious to young animals than to others.

4th. That it exerts its action upon whatever texture it may be brought in contact with, the nerves and dura mater excepted.

5th. That the intensity of this action varies according to the part upon which it is applied; thus for instance, it is extremely deleterious when injected into the jugular vein or into the trachea *(Emmert)*; it is less so when injected into the thorax; still less when introduced into the stomach or rectum; its action is still more weak when applied to wounds, and death takes place sooner when the wound has been made on the anterior limbs. *(Emmert.)*

6th. That if the dose be not sufficiently strong to procure death, the animal returns very speedily to life, more especially if the poison has been brought in contact with the eye, or with the stomach.

7th. That its effects depend on its being absorbed and carried into the circulation.

8th. That its action is retarded, but not suspended, when it is brought in contact with a part which no longer communicates with the brain or spinal marrow.

9th. That it appears to act on the human species as on the warm blooded animals.

10th. That it destroys the irritability, and ought to be classed amongst the narcotics.

11th. That it does not produce any inflammatory lesion capable of being demonstrated after death; nevertheless, that the venous system appears distended, whilst the arteries are empty, the pupils frequently dilated, the lungs spotted; alterations which are common to a very great number of the stupifying poisons.

882. It is evident that the distilled water and oil of Laurel, as well as bitter almonds, exert a mode of action analogous to that of Prussic Acid.

The watery extract of Laurel is not poisonous, or very little so, which doubtless depends on the Prussic Acid being volatilized during the evaporation of the fluid, to the consistence of an extract.

OF THE STRONG SCENTED LETTUCE (*LACTUCA VIROSA*).

883. This plant belongs to the Syngenesia Polygamia Æquales of Lin. to the family of the *demi-flosculeuses* of Tournefort, and to the order of the *Chicoraceæ* of Jussieu.

Characters. Flowers compound, yellowish, disposed in small clusters, not very thickly furnished; calyx common (involucrum) imbricated, and formed of scales straight and elongated, pointed, unequal, membranous on the edges; semi-floscules hermaphrodite, ligulated, and dentated: receptacle smooth, pointed: seeds oblong, compressed, and crowned each by a tuft pedicellated, capillary, soft and fleeting: stalk straight, whitish, covered with scattered prickles, and furnished towards the superior part with branches alternate and slender; inferior leaves oblong, oval, amplexicaul, auriculated at the base, unequally dentated, and thorny on their upper side; the superior are arrow-shaped and entire, having only a few teeth almost thorny at their lobes. All the parts of this plant contain a milky juice, viscid, bitter, and of a bad smell. It is found in the fields, hedges, and sides of walls.

ACTION OF THE STRONG SCENTED LETTUCE ON THE ANIMAL ECONOMY.

Experiment 1st. A strong dog was made to swallow about a pound and half of the leaves of strong scented Lettuce: the animal did not appear to be incommoded.

Experiment 2nd. Two drachms of the watery extract of strong scented Lettuce, bought of an apothecary, were applied to the cellular texture of the back of a dog. Five days after, the animal experienced such vertigoes that he could not stand; he had all along refused food, but had not experienced any

remarkable symptom. He died the same day. No sensible alteration was perceived in the internal organs.

Experiment 3rd. The same experiment was repeated upon a small dog. At the end of two days, the animal, who had only been slightly drowsy, had some slight vertigoes, and died seventy hours after the operation. The ventricles of the brain contained no fluid; the exterior veins of that organ were distended and injected with black: the lungs presented a few patches of a brown red colour; their texture was somewhat more dense than natural.

Experiment 4th. At half past seven in the morning, the same experiment was made upon a great robust dog, with two drachms of the extract of strong scented Lettuce, prepared by *evaporating in a water-bath the juice of the fresh plant.* The animal experienced nothing in the course of the day. At half past nine in the evening, he complained a little. At eleven, he began to experience vertigoes. The next morning at seven, he was found dead. He was opened immediately. The legs were extended, widely separated, and in a state of remarkable rigidity; the blood contained in the ventricles of the heart was black and coagulated; the lungs and digestive canal presented no perceptible alteration; the limb operated on was scarcely inflamed.

Experiment 5th. At eight in the morning, three drachms of the same extract dissolved in two ounces of water, were introduced into the stomach of a small dog, and the œsophagus was tied. The next day, at noon, no remarkable phenomenon had been observed. The animal died the following day, at six in the morning. The *dissection of the body* threw no light on the cause of his death.

Experiment 6th. Thirty-six grains of the same extract, bought of an apothecary, and dissolved in four drachms of water, were injected into the jugular vein of a dog of middle size. At the end of two minutes, the animal vomited some

half digested food ; he ran rapidly over the laboratory, then stood still ; the head was heavy ; he appeared a little drowsy, and his posterior extremities began to grow feeble. Seven minutes after the injection, he experienced some vertigoes ; staggered in walking ; and, in two minutes more, fell on his posterior limbs ; a few moments after, he lay down on the side. He saw and heard very well ; his breathing was a little obstructed and accelerated. He remained six minutes in this state ; he was then shaken ; he made seven or eight steps without stumbling, and then fell down again ; his head was reflected upon the back, his paws were agitated with slight convulsive motions, he uttered a few plaintive cries, made some fruitless efforts to vomit, and expired at the end of three minutes. He was immediately opened. The blood contained in the heart was fluid, without any alteration of its colour ; the lungs were crepitating and rose-coloured, and contained only a small quantity of blood.

Experiment 7th. Forty-eight grains of the same extract, dissolved in three drachms of water, were injected into the jugular vein of a small robust dog. The animal was instantly put to sleep, passed a small quantity of yellowish excrement, fell down on the side, and expired three minutes after without shewing the least convulsive struggle. The *dissection* took place immediately. The heart was no longer beating ; the blood contained in the left ventricle was red and fluid ; almost the whole of that enclosed in the right cavity was coagulated and black : the lungs were rose-coloured, crepitating, and floated in water.

We read in *Vicat ;* " The strong scented Lettuce intoxicates those who eat of it, or who respire the vapour arising from it whilst cooking. In a word, an opium as active as that furnished by the poppy may be obtained from it. (Op. citat. p. 209.) It is easy to perceive, that the assertion of this author is incorrect, by comparing the small degree of

activity of the extract of this plant with the energetic properties of Opium, and especially of its extract.

884. The facts just related lead us to believe,

1st. That the extract of the strong scented Lettuce, prepared by evaporating the juice of the plant by a gentle heat, is more active than that which has been prepared by decoction.

2nd. That it is absorbed and carried into the circulation, and that its action is more intense and more rapid when it is injected into the jugular vein, than when applied to the cellular texture of the thigh: this last mode of application is followed by effects more decided than when the extract is introduced into the stomach.

3rd. That it acts on the nervous system after the manner of the narcotics.

OF THE SOLANUM.

885. The experiments of *M. Duval* prove evidently, that the *Solanum Dulcamara* may be administered in a strong dose without any inconvenience. He administered to dogs as much as four ounces of its watery extract, without their having experienced any accident. The same thing happened to one of these animals that was made to take one hundred and eighty ripe berries of the *Solanum Dulcamara*. A cock, that swallowed fifty of them, did not seem at all incommoded. With the intention of understanding the influence of the state of maturity of these fruits, a dog was made to take a hundred berries of Dulcamara before they were ripe: they gave rise to no symptom. *M. Fages*, doctor of Montpellier, has employed the watery extract of Dulcamara, in a very strong dose, on a man affected with herpetic eruption. On the forty-seventh day of the treatment, the patient took daily, in one single dose, ten grains of the watery extract of Dulca-

mara. In another instance, this medicine was carried with impunity to thirty-two drachms, which was divided into two doses.*

The Nightshade *(Solanum Nigrum)* has likewise fixed the attention of *M. Duval:* he has given to porpoises, dogs, and cocks, from thirty to a hundred berries of *Solanum Nigrum* and of *Solanum Villosum,* without their having experienced the least inconvenience. He has eaten himself at different times a tolerably large quantity of these berries, without any accident. *M. Duval* is of opinion, from these facts, that the history of poisoning by the Nightshades, found in the works of *Gmelin,* of *M. Alibert,* and in the *Ephemerides des Curieux de la Nature,* belong rather to the fruit of the *Atropa Belladonna,* which was classed with the *Solana* by the botanists anterior to *Tournefort.* It is evident that the observation reported by *Wepfer (de Solano Furioso,* p. 222, *libr.* citat.) belongs also to the *Belladonna.*

886. We have made some experiments with a view to determine what was the action of the watery extract of Nightshade prepared by evaporating in a water-bath the juice of the fresh plant.

Experiment 1st. At seven in the morning, seven drachms and a half of this extract dissolved in three ounces and a half of water, were introduced into the stomach of a very strong little dog, and the œsophagus was tied. At four o'clock, the animal did not appear to have suffered any inconvenience. The next day, at eight in the morning, he was somewhat dejected. At five in the evening, he shewed no remarkable phenomenon. The day following, at six in the morning, he was insensible and motionless. He expired a quarter of an hour after. He was opened at half past seven. The limbs were flaccid, the heart contained no blood; the lungs pre-

* *Histoire Naturelle, Médicale, et Economique des Solanum,* par M. Duval, 1813, pp. 70, 73, and 99.

sented patches of a deep red, less crepitating than the other parts, which were of a rose colour; there was no alteration in the digestive canal.

Experiment 2nd. The same experiment was begun with six drachms of the extract on a small dog. The animal died at the end of forty-eight hours, and exhibited the same symptoms and the same lesions.

Experiment 3rd. At eight in the morning, two drachms of the same extract, dissolved in one drachm and half of water, were applied to the cellular texture of the thigh of a little dog. The animal died forty-six hours after, and had not exhibited any remarkable symptom during the first forty hours; he then fell into a state of great insensibility. On opening the body, the lungs were found slightly distended; the other organs were sound; the wound was very little inflamed.

887. These facts induce us to believe,

1st. That the extract of Nightshade is not very poisonous.

2nd. That it is slowly absorbed, and destroys sensibility and mobility.

M. Dunal has however observed, that the juice of *Solanum Nigrum, Villosum, Nodiflorum, Miniatum,* applied to the eyes, occasioned a slight dilatation of the pupil, and rendered the organ insensible to the impression of a bright light. (p. 88.) These effects continued for two, three, four, or five hours, and have constantly been less than those obtained by rubbing these same parts with the juice of *Belladonna.*

Solanum Fuscatum (Melangena Fructu Rotundo, cum Spinis Violaceis of *Tournefort).* A dog was made to swallow the pulp and seeds of fifteen berries of this species; the breathing very shortly became difficult; the muscles of the abdomen contracted and relaxed with some violence; the lips were quivering, the mouth foaming; the animal made fruitless efforts to vomit; the heat of the body was very much increased; and he threw himself from side to side. An hour and

a half after, he was more calm, and had vomited a great quantity of the poison: he was soon after perfectly recovered. (DUNAL, p. 104.)*

Taxus Baccata (Yew). Different opinions have been advanced concerning the properties of this plant. *Ray, Berkley, Matthiolus, Bauchin, Julius Cæsar*, &c., affirm it to be poisonous. *Lobelius, Camerarius, Haller*, &c., are of a different opinion. *Bulliard* says; "I have several times swallowed the yew berries, after the example of the children, who give to this fruit the name of *Morviaux:* I have remained for a long time, and during the greatest heats, in places planted with yews recently trimmed: I have never experienced the slightest inconvenience from it." (Op. citat. p. 157.) We are of opinion that it ought to be ranked amongst the narcotics, and that the different opinions of authors on this subject arise from the circumstance of their having examined yews of different ages, and exposed in different places.

We have injected into the jugular vein of a large strong dog, forty grains of the watery extract prepared with the leaves of this plant, and dissolved in half an ounce of water. Two minutes after, the animal experienced vertigoes; his head appeared heavy; his posterior extremities began to bend. Five minutes after, he was asleep, and on the point of falling, when he was suddenly awoke. These symptoms diminished, and the next day the animal seemed to be recovered. The same experiment was again instituted on a dog of middle size, not so

* The beautiful memoir of *M. Dunal* is terminated by the following paragraph: "The facts which we have reported, are in opposition to the general opinion, which is, that all the *Solana* are poisons. The causes of this opinion are: 1st. That plants, extremely different to each other, have been confounded, by attributing to some of them the properties of others; 2nd. That it has not been remembered, that the properties of plants ought to be examined from organ to organ. 3rd. That the too general precepts of Linnæus have been believed without examination: *Plantæ quæ genere conveniunt etiam virtute conveniunt, quæ ordine naturali continentur etiam virtute propius accedunt.*"

strong as the former. He experienced the same symptoms, and died in the course of the night: no alteration could be perceived on dissection.

Actæa Spicata. *Linnæus* says, that the berries of this plant have excited a furious delirium, succeeded by death. *Colden* reports, that the ingestion of these fruits, and of a tincture prepared with the root of this plant, was succeeded by a considerable degree of anxiety and cold sweats, without however any other serious accident.* *Le Monnier* affirms, that its extract killed fowls. We have often given to dogs from four to six ounces of a decoction of *Actæa Spicata* gathered in the month of May, and have observed no sensible phenomenon.

Physalis Somnifera. *Plenck* ranks the root of this plant amongst the narcotics, and asserts, that it has less of deleterious properties than Opium.

Azalea Pontica. *Gmelin* reports, that the honey gathered from the flowers of this plant, produced in ten thousand Greek soldiers vomitings, dysentery, and intoxication; and they became mad.

Ervum Ervilia (Lentil). *Binninger* has remarked that the bread, into the composition of which the seed of this plant entered, had so much weakened the inferior extremities of the persons who had eaten of it, that they were obliged to walk supported by two crutches.† *Valisneri* has seen incurable palsies produced by this food.‡ Horses and fowls experience similar phenomena from this seed.

Lathyrus Cicera. The seeds of this leguminous plant possess nearly the same poisonous properties as those of the preceding, according to *Divernoi.*

Plenck classes also the *Peganum Harmela* amongst the narcotics.

* Colden, *Act. Upsal,* anno 1743, p. 132.

† *Observ. et Curat. Med.* cent. v. obs. lxx. p. 571.

‡ *Galera di Minerva,* tom. iv. p. 220.

Paris Quadrifolia. It is believed that this plant occasions vomiting and spasms. *Gesner* swallowed a drachm of it in wine and vinegar: he had copious perspirations, and experienced a dryness in the throat. (GESNERUS, 1st. *Epist.* Med. fol. 53.)

Saffron is looked upon by some physicians as a narcotic poison. We have instituted some experiments, which prove that it is not deleterious to dogs, or at least, that it is only so in a very small degree: 1st. Three drachms of Saffron, that had been infused in water for twelve hours, were introduced in the stomach of a small dog: the infusion was also ingested, and the œsophagus was tied. Five days after, the animal had not experienced any remarkable symptom; he was a little dejected. He died the following day, and it was impossible to discover the slightest alteration on dissecting the body. A drachm of Saffron, mixed with two drachms of water, was applied to the cellular texture of the thigh of a small feeble dog. The animal died at the end of the fourth day, and had shewn no other symptom than dejection. The opening of the body threw no light on the cause of his death.

OF AZOTIC GAS.

888. Azotic Gas is without colour or smell, and transparent. It extinguishes bodies in the state of combustion: its specific gravity is, as 0,96913: it does not redden the infusion of tournesol: it is insoluble in water, and produces no turbidness with lime-water.

ACTION OF AZOTIC GAS ON THE ANIMAL ECONOMY.

Experiment 1st. Guinea-pigs, when plunged into this gas, are asphyxied at the end of five minutes. They die in three minutes and a half if the experiment be begun by emptying

the lungs of the air that may be contained in them, as *M. Nysten* has proved. At the moment of immersion into an atmosphere of Azote pure, or almost pure, the animal experiences a difficulty in respiration, which becomes great, elevated, and more rapid than ordinary: it grows gradually weak, but without any lesion of the nervous functions. (*M. Dupuytren.*) After death the arterial system is found filled with black blood. This asphyxia only takes place through a defect of oxygen, as young animals can be easily restored to life by exposing them to the air.

Experiment 2nd. *M. Nysten* has injected into the jugular vein of several dogs, from twenty to one hundred and fifty centimetre cubes of Azotic Gas, and observed the following symptoms. Cries expressive of pain, convulsive stiffness of the limbs and trunk, agitation, pulse rare, and hardly perceptible, slow respiration, and death. *M. Nysten* concludes from these experiments that Azotic Gas, injected into the veins, exerts a sedative action upon the vital force of the heart, an action which is independent of another entirely mechanical one which it exerts on this same organ.

Experiment 3rd. The same physiologist has injected into the pleura of a dog one hundred and fifty centimetre cubes of this gas, which has been absorbed, and produced no hurtful effect.

M. Dupuytren has proved that this gas is one of the causes of the *Plomb*,* or asphyxia arising from privies.

OF THE PROTOXYDE OF AZOTE *(OXIDULE D'AZOTE).*

889. This gas is invisible and without smell; it has a sweetish taste; its specific gravity is, as 1,3693. It is soluble in

* This name is given by French writers to a disease common to night-men while employed in emptying privies; it consists of a suffocation and lypothymia, which quickly proves fatal, if not speedily relieved by an emetic, as is their practice.—TRANSLATOR.

water. When brought in contact with a taper presenting a few ignited points, it lights it instantly, and causes it to burn with brilliancy: in this case the gas is decomposed, and the Azote set at liberty.

890. The effects of this gas on the animal economy have not been the same in the different persons who have respired it. *M. H. Davey* experienced at first a giddiness, a pricking sensation at the stomach; towards the end of the experiment, the muscular force increased, and a sort of lively delirium took place, which finished by bursts of laughter. *M. Proust* felt only a stupefaction, and an inexpressible uneasiness. The experiments tried at Toulouse by a society of amateurs, confirm the results obtained by *M. Davey;* some persons however, far from experiencing gaiety, felt a great dilatation, accompanied with heat of the chest; their veins swelled, the pulse became accelerated, and objects appeared to turn round with them. *M. Psaff,* in giving an account of the experiments recently made at Kiel, says; "One of the persons who respired this gas was very quickly intoxicated, and thrown into a very extraordinary and extremely agreeable ecstacy." We have likewise undergone an experiment of this kind: the Protoxyde of Azote on which we operated was perfectly pure, and we were quickly obliged to suspend the experiment: vertigoes, an inexpressible uneasiness, a burning heat in the chest; such were the symptoms we experienced, and which brought on a syncope of six minutes duration. *M. Nysten* has concluded from a multitude of experiments made by injecting this gas into the veins; 1st. That it dissolves with the greatest promptitude in the venous blood of the animals into which it is injected. 2nd. That when injected in the quantity of from thirty to forty decimetre cubes, it does not at first give rise to any observable primitive effect; but if the injections are multiplied, especially if the dose be augmented, it finishes by producing on the nervous system phenomena similar to those it produces when respired in great quantity, and those pheno-

mena may be followed by death, which begins then by the brain. 3rd. That notwithstanding the solubility of the acidulous gas of Azote, if a very large quantity of it be injected at once, for instance, 200 or 300 centimetre cubes, it instantly produces the distention of the pulmonary portion of the heart, and death, which in that case begins by the heart. 4th. That, injected in considerable quantity, but not sufficient to produce fatal nervous phenomena, and with the necessary precautions to prevent distention of the heart taking place, it is capable of occasioning staggering, but that this effect quickly ceases, and is not followed by any serious consecutive accident. 5th. That it does not occasion any apparent change in the arterial blood. (Op. citat. p. 77.)

SYMPTOMS PRODUCED BY THE NARCOTIC POISONS.

891. The symptoms produced by this class are nearly the same, whether the poisonous substance be introduced into the cellular texture or into the stomach, or injected into the veins; characters which distinguish them from the major part of those which we have been speaking of in the three preceding classes.

892. These symptoms may be reduced to the following; stupor, numbness, heaviness of the head, inclination to sleep, at first slight, afterwards insurmountable; vertigoes, a sort of intoxication, furious or lively delirium, sometimes *pain;* convulsive movements slight or strong in all parts of the body; paralysis of the posterior extremities, dilatation of the pupils, diminished sensibility of the organs of sense, state resembling apoplexy, pulse frequent or rare, full and strong, particularly in the first period of the malady; respiration in the natural state, sometimes however a little accelerated; nauseas, vomitings, especially when the poison has been applied to the cellular texture, or injected in a glyster; the nervous symptoms

grow more severe, and the animals die. Death takes place very suddenly when the poison has been injected into the veins; it is less so, when it has been applied to the cellular texture: lastly, it happens still more slowly when it has been introduced into the stomach.

LESIONS OF TEXTURE, PRODUCED BY THE NARCOTIC POISONS.

1st. No alteration can be discovered on dissection in the digestive canal of persons, who have swallowed one of the poisonous substances of this class; and if facts contrary to this assertion be met with in authors, it is because there have been administered irritating substances capable of producing inflammation.

2nd. When applied to the cellular texture, or to the cutis, they produce a slight irritation similar to what any other extraneous body would do.

3rd. The lungs frequently exhibit lesions similar to those we have described in giving the history of acrid substances, (p. 99), and it is remarkable enough, that a number of those animals which are affected with this lesion do not experience, when alive, any morbid phenomenon which could give rise to a suspicion of it: respiration is neither accelerated nor difficult. This fact, it appears to us, ought to be placed beside another, which is sometimes observed in the human species, viz; *that there are cases of chronic, or even of acute pneumonia, without either cough or expectoration, or fever; the patients do not even complain of breathing with any great degree of difficulty.**

* The diagnosis in these diseases can only be established with certainty, by the concurrence of the two following signs; 1st. The impossibility of making deep respirations. 2nd. The pain of the breast: single, these signs would be of small avail; combined, they are sufficient for deciding on the existence of this affection. How often have we seen our friend and master

4th. The blood contained in the ventricles of the heart, and in the veins, is frequently coagulated a short time after death: an assertion diametrically opposite to that advanced by several professors of Medical Jurisprudence.

5th. The brain and its meninges frequently exhibit distensions of the veins, which creep over their surface, or are distributed throughout their texture. The lesions of the other organs appear to us inappreciable.

TREATMENT OF POISONING BY THE NARCOTICS.

893. The remedies hitherto proposed as antidotes for the Narcotic poisons, are, 1st, vinegar and the vegetable acids; 2nd, the infusion or decoction of coffee; 3rd, a solution of Chlorine in water (fluid oxygenated muriatic acid); 4th, Camphor; 5th, water and emollient drinks; 6th, bleeding. We shall here relate the experiments we have made for ascertaining the efficacy of these means, principally in cases of poisoning by Opium. We shall afterwards speak of the steps necessary to be taken by the medical attendant in cases of this nature.

1st. *Of Vinegar and the Vegetable Acids.*

894. *Ought we, in the present state of medical knowledge,* to persist obstinately in admitting a fact, not supported by rigorous experiments, merely because some illustrious men have advanced it, and it has been generally adopted? Whatever be the respect due to the illustrious characters who are constantly and successfully occupied in bringing to perfection human knowledge, we are of opinion that it is of importance not to embrace their opinions, when they are the declaration

Dr. Recamier, whose medical knowledge is so extensive, recognise by these means affections of the lungs, which had escaped the sagacity of other practitioners?

of incorrect facts, and tend rather to retard than accelerate the progress of medical science. Wherefore we shall not hesitate to oppose a doctrine, professed still in our days by the greatest masters of the art, to wit; *that vinegar and vegetable acids are antidotes to Opium.* In fact, vinegar and the other vegetable acids can only be the antidotes to Opium, in as much as that they decompose it rapidly in the stomach, and convert it into a substance, the effects of which will not be hurtful to the animal economy; now we are able to affirm from a very great number of facts collected with care, *that these acids aggravate the symptoms of poisoning by Opium, whenever they are not vomited.* The following are the proofs of this proposition.

Experiment 1st. A young cat was made to take three drachms of vinegar containing Opium in solution, and mixed with six drachms of water. Ten minutes after, the animal was asleep. At the end of ten more it was insensible, and lying down upon the side: its muscles exhibited continual convulsive motions, and so violent, that every part of the animal was in extreme agitation; these shocks continued three hours afterwards, but the animal possessed a slight degree of sensibility. It died five hours and a half after the ingestion of the fluid, the muscles were rigid and contracted; the heart contained a tolerable quantity of coagulated blood.

Experiment 2nd. Two drachms of crude Opium bruised, were mixed with an ounce and half of distilled vinegar: forty-eight hours after, this acid had dissolved a tolerable large portion of the poison: it was of a red colour. Two ounces of water were added, and the mixture was introduced into the stomach of a great strong dog; the œsophagus was tied. The animal died five hours after; he exhibited the following symptoms: drowsiness, paralysis of the posterior extremities, trembling of the head, and convulsive shocks. He was opened the next day. The mucous membrane of the stomach was easily

detached, but not inflamed ; the lungs were livid and distended with blood.

Experiment 3rd. Wishing to know whether the deleterious effects observed in the preceding experiment depended on the portion of Opium dissolved in the vinegar, or on the undissolved sediment, another robust animal was made to take the acetic fluid, obtained by putting two drachms of crude Opium in contact, forty-eight hours, with an ounce and a half of vinegar: this fluid was filtered and diluted with two ounces of water. Five and twenty minutes after, the animal was under the influence of the poison, and died at the end of five hours. The digestive canal exhibited no trace of inflammation.

Experiment 4th. At nine in the morning, two drachms of the watery extract of Opium were introduced into the stomach of a small robust dog, having been perfectly mixed with two ounces of distilled vinegar, and three ounces of water: the œsophagus was tied. Ten minutes after, the animal made efforts to vomit. At half past nine he became sleepy. At fifty minutes after nine, the posterior limbs were extremely weak, and the animal could not walk without bending them exceedingly. The ligature of the œsophagus was untied, and two ounces of vinegar, mixed with four ounces of water, were again introduced into the stomach. At a quarter past ten, he was no longer able to lift the hind feet, walked with great difficulty, dragging them after him, and had some convulsive movements. At eleven o'clock, these movements became very violent, and took place by shocks similar to those seen in frogs exposed to the action of the Voltaic pile ; his limbs were stiff, stretched out ; and he was in a state of great dejection. He was once more made to take an ounce of vinegar mixed with two ounces of water. He made horrible contortions, beat himself about, and expired a quarter of an hour afterwards. The mucous membrane of the stomach was slightly inflamed.

Experiment 5th. At noon, the œsophagus of a large and strong dog was detached and perforated: two drachms of crude Opium, as much divided as possible, contained in a paper cone, were then introduced into the stomach. Twenty minutes after, he was made to take three ounces of vinegar mixed with an equal quantity of water, and the œsophagus was tied. At two o'clock the animal did not appear to be at all under the influence of the poison. The ligature was detached, and eight ounces of vinegar, with four of water, were again introduced into the stomach. At five o'clock, he was lying down on the belly, and was not capable of keeping himself a moment on his feet; his body, which was agitated by violent convulsive movements, was tossed about in all directions; his extremities, stiff and separated asunder, were beating together almost continually. These symptoms continued till eight o'clock, and the animal died. He was opened the next day. The stomach contained a very great quantity of vinegar and a little Opium; its mucous membrane, which was of a blackish red, was easily detached, and ulcerated in several points: the subjacent coat, which was of a dark colour, was scattered over with blackish streaks: the lungs were gorged with blood in a fluid state.

895. If the effects produced by Opium and its extract administered alone, be compared with those produced by them associated with vinegar, we shall be obliged to conclude, 1st. That, in the first case, the phenomena of poisoning are longer in making their appearance. 2nd. That they are in general much less violent. 3rd. That death constantly takes place at a later period. 4th. That they are scarcely ever followed by inflammation of the stomach, whilst vinegar instantly produces it, when it is a little concentrated.

896. It is then evident that the use of this acid would be followed by the most serious symptoms, if the animals to which it is administered should not vomit the poison which has been

introduced into the stomach. It happens differently when the poisonous substance has been expelled by vomiting: in that case, the vinegar and water, and other vegetable acids, possess the property of *diminishing the symptoms of poisoning*, and *even to put an end to them altogether*. The following are the experiments on which this important proposition is founded.

Experiment 1st. At eight in the morning, thirty-three grains of the watery extract of Opium, dissolved in a drachm and half of water, were applied to the cellular texture of the thigh of a dog of middle size. At half past eight, the animal was asleep, and labouring under violent convulsions; his posterior extremities were almost completely paralyzed. Six ounces of vinegar and water were introduced into the stomach, by the assistance of a tube of elastic gum and a syringe; five minutes after, the convulsions were not at all diminished. At eleven he was nearly in the same state, four ounces of vinegar and water were again injected into the stomach; at half past twelve the animal appeared better, and began to be able to support himself on his posterior extremities; five ounces of vinegar and water were given to him: at half past two he had no more convulsive movements, and was able to stand on his legs; four ounces more of vinegar and water were administered to him: at a quarter before five, the animal was sensibly better; *(four ounces of vinegar and water):* at seven in the evening, he was walking about freely; he was made to take a fresh dose of the same fluid; at half past ten he experienced no giddiness, and appeared almost recovered *(four ounces of vinegar and water).* The next morning, at seven o'clock, he was lying down upon the side, and had a slight propensity to sleep; six ounces of vinegar and water were given to him, and the effects of the Opium completely ceased: the following day he took food, and was in extraordinary good health ten days afterwards. It was ascertained, by repeated experiments, that

twenty grains of the same extract placed within the cellular texture, constantly produced the death of animals of the same size, in six, twelve, fifteen, or eighteen hours.

Experiment 2nd. At half past seven in the morning, eight ounces of vinegar and water were introduced into the stomach of a small dog; the œsophagus was tied. Immediately after, thirty grains of the watery extract of Opium, dissolved in two drachms of water, were injected into the cellular texture of the thigh. At five minutes before eight, the posterior extremities were a little feeble; the animal was drowsy and uttered slight complaints. At nine the ligature of the œsophagus was untied, and four ounces of vinegar and water were injected into the stomach. At eleven, the symptoms of poisoning were not more violent. *(Two ounces of vinegar and water.)* At one, the weakness of the extremities continued; the animal was not able to remain long at a time on his legs; nevertheless he could walk. At ten minutes after two, he walked with greater ease. *(Two ounces of vinegar and water.)* At six he was sensibly better, he was made to take a fresh dose of the medicine; but as the attentions to him were discontinued, he died at four in the morning.

897. It is certain that in this experiment, the vinegar and water prevented the symptoms of poisoning, from being carried to the degree they would have been if it had not been administered; there is likewise no doubt that they would in the end have disappeared altogether, if the animal had not been so feeble, and more especially if this medicine had been continued to him during the night. We could relate a very great number of similar facts, which prove that when vinegar and water is employed at several different doses, within the first four and twenty hours of the poisoning, the symptoms decrease in violence, however severe they may have been at first. We shall prove hereafter, that the good effects of this drink do not depend on the water which it contains.

Experiment 3rd. At five minutes before eight, six ounces

of water, acidulated with *tartaric* acid, were introduced into the stomach of a small robust dog; the œsophagus was tied: immediately after, thirty grains of the watery extract of Opium were injected into the cellular texture of the thigh. At a quarter past eight, the posterior extremities were somewhat feeble. At nine the animal was asleep; the weakness of the posterior limbs was increased: the ligature of the œsophagus was detached, and four ounces of the tartaric water were injected into the stomach. At eleven, in the same state *(four ounces of the same medicine)*: at two, the animal was already able to walk; the drowsiness was less, a fresh dose of the same medicine was given; at six in the evening he continued better *(four ounces of the tartaric water)*: the attentions to him were discontinued, and he died at four in the morning.

Experiment 4th. Another animal was submitted to the same experiment, with this difference, that the dose of extract injected into the cellular texture, was forty-eight grains, and the œsophagus was not detached. The animal died twenty-two hours after the operation: he was made to take at nine different times the tartaric water, and a diminution was observed in the symptoms: he died in the morning because the medicine had been neglected to be administered to him during the night. It is certain that, without the use of the acidulated water, he would have died four or five hours after the injection.

Experiment 5th. At eight in the morning forty grains of the watery extract of Opium, dissolved in two drachms of water, were injected into the cellular texture of the thigh of a small strong dog. At nine the dog was under the influence of the poison; six ounces of common lemonade were introduced into the stomach: the œsophagus was tied. At half past eleven, the animal was labouring under tolerably strong convulsive movements; the posterior limbs were paralyzed *(three ounces of lemonade)*: at two, he was in a deep sleep. He was made to take four more ounces of lemonade, and another

dose was given him at six: at half past eight, the sleep was less profound, the animal was able to support himself upon his posterior extremities (*four ounces of lemonade*). This medicine was discontinued during the night, and he died at four in the morning.

2nd. *Of the Infusion and Decoction of Coffee.*

Experiment 1st. At nine in the morning, two drachms of the watery extract of Opium, dissolved in three ounces of a strong infusion of coffee, at the temperature of 40°, were introduced into the stomach of a small robust dog; the œsophagus was tied.* At eleven the animal was scarcely under the influence of the poison; his posterior extremities began to grow weak. The ligature of the œsophagus was untied, and three ounces more of the same infusion were injected into the stomach. At one the pupils were dilated, the animal still walked about freely, and had no tendency to drowsiness. He was made to take eight ounces of the same medicine: immediately after, he made some efforts to vomit, which depended probably on the great quantity of fluid contained in the stomach. At three, he was extremely agitated; his eyes started from the orbits, the body was stiff, and the posterior limbs completely paralyzed; from time to time the animal attempted to rise; he moved himself in every direction, dragging the hind feet after him; then stopped all at once, grasped the ground with his fore feet, reflected his head upon the back, and appeared to suffer considerably. From the beginning of the experiment, he had preserved the faculty of seeing and hearing; six ounces of the same infusion were administered to him: the symptoms continued, and he expired at twenty minutes after four.

* The infusion, which we have employed in all our experiments, has been prepared by pouring from eighteen to twenty ounces of boiling water upon seven or eight ounces of excellent coffee, reduced to a fine powder.

Experiment 2nd. At seven in the morning, thirty-four grains of the watery extract of Opium, dissolved in a drachm of water, were injected into the cellular texture of the thigh of a dog of middle size. At a quarter before eight, the posterior extremities were completely paralyzed, the animal had a great tendency to sleep, and exhibited from time to time violent convulsive shocks: he was made to take four ounces of a strong infusion of coffee at the temperature of 40°. At nine, the symptoms continued, a fresh dose of this medicine was administered to him, and was continued every two hours till ten at night. At noon, the symptoms began already to diminish; at four the animal had no longer any convulsive movements, and was walking about at his ease. At seven in the evening he appeared very much awake, and was running about the laboratory as if he had not met with the least accident: he was the same the next morning. During the day he was neglected; the symptoms returned afresh, and he died towards eight in the evening.

Experiment 3rd. At half past eight in the morning, the same experiment was repeated upon a small dog, upon whom only twenty grains of the watery extract of Opium were injected. Three quarters of an hour after, the animal presented all the symptoms of poisoning; he was made to take four ounces of the infusion of coffee: at half past ten, he experienced no relief, a fresh dose of the same medicine was given to him; at noon, the symptoms appeared somewhat diminished *(four ounces of infusion of coffee)*: at three, the posterior extremities extremely feeble, and the head presented a very remarkable trembling. At five, there were no more convulsive movements *(four ounces of the infusion of coffee)*. At eight, the animal was able to stand, and walked about with tolerable ease; the trembling of the head had entirely disappeared: the attentions to him were discontinued, and he died in the night.

Experiment 4th. At nine in the morning, forty grains of

the watery extract of Opium were injected into the cellular texture of a small strong dog. At a quarter past, the posterior extremities were feeble: four ounces of infusion of coffee were introduced in the stomach. At ten, the animal was nearly in the same state; he was made to take a fresh dose of the same medicine. At half past eleven, he exhibited violent convulsive shocks, and kept himself lying down on the side. At three, the symptoms of poisoning were diminished *(three ounces of infusion of coffee)*. At a quarter past six, the convulsive movements had disappeared, the animal was walking about at his ease; the posterior extremities were however somewhat weak. There is no doubt that if the same means had been continued, the health of this animal might have been restored. No assistance was given to him during the night, and he died the next morning at seven o'clock.

Decoction of Coffee.

Experiment 1st. At ten in the morning, two drachms of crude Opium bruised and mixed with ten ounces of a strong decoction of coffee, were introduced into the stomach of a large dog: the œsophagus was tied. At four, the posterior extremities were feeble, and the animal had only a very slight tendency to sleep: he died the next day at four in the morning. The vessels creeping over the exterior surface of the brain were slightly injected; there was no serosity in the ventricles; the lungs presented several patches of a dense texture, and of a livid colour; the digestive canal was sound.

Experiment 2nd. At three in the afternoon, a robust dog of middle size was made to swallow three ounces of coffee, which had been made to boil for half an hour in twelve ounces of water; the œsophagus was detached, and two drachms of crude Opium bruised, mixed with the decoction resulting from three ounces of coffee, were introduced into the stomach: the œsophagus was then tied. Three hours afterwards the

symptoms of poisoning were evident, and the animal died the next day, at one in the afternoon.

Experiment 3rd. At two o'clock, a dog of middle size was made to swallow twenty-three grains of Opium, and a drachm of the watery extract of the same substance. Forty minutes after, the animal was asleep, and his posterior extremities grew feeble. Eight ounces of a strong decoction of coffee were injected into the stomach by means of a tube of elastic gum; some moments after, he passed a stool composed of solid matter: at half past four the symptoms of poisoning were not diminished; he was made to take twelve ounces more of the same decoction, and six ounces of the powder of coffee: the animal died in the night. The digestive canal presented no vestige of inflammation.

Experiment 4th. At a quarter before nine, twenty-four grains of the watery extract of Opium, dissolved in one drachm of water, were injected into the cellular texture of the thigh of a small dog. At half past nine, the animal presented all the signs of poisoning; he was made to take three ounces of a strong decoction of coffee. At a quarter before eleven, he complained greatly, and was so much agitated by convulsive movements, that it was impossible to inject a fresh dose of the medicine into the stomach. A glyster was administered to him, consisting of six ounces of decoction of coffee; the symptoms acquired a greater degree of violence, and the animal died at half past twelve.

898. It results from these experiments:

1st. That the infusion and decoction of coffee ought not to be considered as antidotes of Opium, because they do not possess the property of decomposing it in the stomach, or rather because they do not convert it into a substance destitute of any quality prejudicial to the animal economy.

2nd. That neither one or the other of these two preparations of coffee, when introduced with Opium into the stomach, increase the deleterious action of this poison, as takes place with

vinegar; and consequently that there is no danger of employing them in any case where the person would not be able to vomit, whilst there would be a great deal in employing vinegar under the same circumstances.

3rd. That the infusion of coffee well prepared, administered at several different times, diminishes rapidly the symptoms of poisoning by Opium, and may even put a stop to them altogether.

3rd. *Of Chlorine dissolved in Water (fluid Oxygenated Muriatic Acid).*

899. It has been announced in some work on the Materia Medica, that Chlorine diminishes the action of Opium on the animal economy. Supposing this fact true, we have thought that it might be explained by the facility with which this body seizes on the hydrogen of certain vegetable and animal substances, and decomposes them. It was possible that the result of such a decomposition was a matter incapable of exerting an injurious action on the animal economy: in this case, Chlorine would have been an *antidote to Opium,* and, for the same reason, it would have been so probably to a very great number of other poisonous substances belonging to the vegetable kingdom. These considerations have appeared to us sufficiently important to fix the whole of our attention, and we have tried the following experiments.

Experiment 1st. Two drachms of the watery extract of Opium, suspended in ten ounces of water containing Chlorine, were introduced into the stomach of a strong dog (this fluid Chlorine was not sufficiently concentrated to discolour ink); the œsophagus was tied. At the end of three quarters of an hour, the animal was under the influence of the poison, and expired five minutes afterwards. The digestive canal exhibited no vestige of inflammation; which proves that the solution of Chlorine was extremely weak, since we have seen, (page 94 of this volume) that it inflames the texture of the stomach when moderately concentrated.

Experiment 2nd. At nine in the morning, two dogs were made to swallow two drachms of crude Opium, enclosed in two paper cones; and the œsophagus of each was tied. At one o'clock their posterior extremities were paralyzed. The ligature of the œsophagus was untied, and four ounces of Chlorine dissolved in water, were introduced into the stomach. At two, the symptoms, far from diminishing, were become more violent (the same dose of Chlorine). At five in the evening, two fresh doses of this medicine had already been administered; the animals died in the night. The mucous membrane of the stomach was strongly inflamed.

Experiment 3rd. At half past nine, a mixture of two drachms of the watery extract of Opium, and four ounces of a watery solution of Chlorine, moderately concentrated, were introduced into the stomach of a strong dog: the œsophagus was then tied. The animal soon made some efforts to vomit, and experienced all the symptoms of poisoning by Opium; and died at the expiration of six hours. The mucous membrane of the stomach was of a bright red throughout its whole extent; the subjacent muscular coat was of a rose-colour; the interior of the rectum presented an inflammation sufficiently distinct; the lungs exhibited here and there some livid patches.

These experiments, repeated on a number of animals, have constantly given the same results. It is evident that at the degree of concentration, at which Chlorine might be capable of decomposing Opium in the stomach, it ought to be considered itself as an acrid poison, and that consequently it cannot be employed as an *antidote* to this poisonous substance. The first experiment proves likewise that, when it is very much diluted and mixed with the Opium in the stomach, it does not prevent the symptoms from taking place. We wished to discover what would be the effects of the solution of Chlorine on the disease produced by Opium, when this poison is not in the stomach.

Experiment 4th. At a quarter before nine, thirty-six grains of the watery extract of Opium, dissolved in one drachm of water, were injected into the cellular texture of the thigh of a small robust dog. Six minutes after nine, the animal exhibited all the symptoms of poisoning by Opium. Four ounces of water containing a small quantity of Chlorine, were administered to him. At half past ten, his situation did not appear to be changed. He was made to take another dose of the same medicine: at a quarter past one he had passed several stools, and was somewhat better *(four ounces of water containing Chlorine)*. At three o'clock the animal was quiet, the posterior extremities were less feeble *(fresh dose of the medicine)*. At five he was capable of standing; at seven he walked about freely *(four ounces of water, slightly impregnated with Chlorine)*. No assistance was given to him during the night. The next morning at seven o'clock, he staggered a little, and appeared dejected: he was made to take four ounces more of the same medicine; but died five hours afterwards. This experiment, twice repeated, furnished the same results; whence it follows, that a weak solution of Chlorine is capable of diminishing the effects produced by Opium, and might probably put an end to them altogether if its administration were not interrupted; however, as this medicine does not present any decided advantages over vinegar, and since its preparation is somewhat complicated, we ought to give the preference to this vegetable acid, which daily necessities render extremely common.

4th. *Of Camphor.*

900. Camphor has been extolled by some as the antidote of Opium. We wished to ascertain how far this assertion was well founded.

Experiment 1st. Two drachms of Opium, and as much Camphor bruised, were introduced into the stomach of a small robust dog. Twelve hours after, the animal was under

the influence of the Opium, his extremities were slightly paralyzed. He died thirty-six hours after the ingestion of the mixture. The digestive canal exhaled a strong smell of Camphor; the mucous membrane of the stomach was of the natural colour; but it presented near the pylorus *two ulcers*, each one as large as a shilling, with elevated edges, and blackish.*

Experiment 2nd. A mixture made with two drachms of the watery extract of Opium, and as much Camphor dissolved in two ounces of olive oil, was introduced into the stomach of a robust dog of middle size: the œsophagus was then tied. At the end of half an hour, the animal experienced a horrible convulsive fit produced by the Camphor, and expired a quarter of an hour after.

In other experiments, the doses of these two substances were varied, and it was observed that death constantly took place when they were administered in a sufficiently strong dose, and that the phenomena which preceded it depended at one time upon the Camphor, at another time on the Opium, according as one or the other of these poisons happened to be in excess.

901. These facts are sufficient for us to affirm that Camphor does not decompose Opium, and hinder it from acting as a poison, and consequently that it is not its *antidote*. We shall see however, at the end of this article, that the physician may employ with success small doses of this medicine, in order to combat the symptoms produced by a large quantity of Opium.

5th. *Of Water and Mucilaginous Drinks.*

902. We have established that water acidulated with the vegetable acids might be extremely useful in cases of poisoning by the narcotics, and especially by Opium. Might it not

* We shall see hereafter that this alteration is owing to the fragments of Camphor.

be imagined that the good effects of this drink depend on the great quantity of water which enters into its composition ?—the desire of throwing a light on this subject has engaged us to make some experiments, the results of which ought so much the more to excite our curiosity, as *M. Porta,* an Italian physician, has lately announced positively in one of the last numbers of the Journal of *M. Leroux, that by means of cold water administered in drink and in glyster, and applied in fomentation to the abdomen,* he obtained the cure of a lady who had been poisoned by mistake with the decoction of three ounces of Opium.

Experiment 1st. At eight o'clock, a drachm and half of the watery extract of Opium, dissolved in eight ounces of water at the ordinary temperature, were introduced into the stomach of a dog of middle size: the œsophagus was tied. At half past eight the animal began to be under the influence of the poison *(six ounces of water).* At nine, the symptoms of poisoning were much more violent: the same quantity of water was administered to him. He died at ten. It is certain that the same quantity of extract dissolved in one or two ounces of water, would not have produced death until the expiration of ten, twelve, or eighteen hours. (Vide page 111 and seq.)

Experiment 2nd. At three quarters past seven, eight ounces of water, at the ordinary temperature, were injected by the assistance of a tube of elastic gum into the stomach of a small weak dog. Immediately after, thirty grains of the watery extract of Opium, dissolved in a drachm and half of water, were injected into the cellular texture of the inside of the thigh. The animal vomited at the end of five minutes; immediately six ounces of water of the ordinary temperature, were injected into the stomach. At nine, the symptoms were alarming: a fresh injection was made of the same fluid. He expired at half past nine.

Experiment 3rd. The next day, at the same hour, the ex-

periment was begun on a robust dog of middle size, with the same dose of the watery extract of Opium. At half past twelve, thirty ounces of water, which had been divided into five parts, had been introduced into the stomach; the animal was not less under the influence of the poison. The symptoms, far from diminishing, had acquired greater violence, and he expired at three o'clock, amidst the most violent convulsions.

Experiment 4th. For the ordinary water, water ad zero in a fluid state was substituted, and was administered in drink and in glyster: the animal died after the second dose, an hour and quarter after the external application of thirty-three grains of the watery extract of Opium. This animal was small and robust.

Experiment 5th. The same results were obtained by applying the mucilaginous decoction, instead of common water.

These experiments prove evidently:

1st. That the good effects of acidulated drinks do not depend on the water which they contain.

2nd. That this fluid ingested into the stomach with Opium, facilitates its absorption, by dissolving it, and consequently that the making patients poisoned by this substance swallow a quantity of it should by all means be avoided.*

6th. *Of Bleeding.*

903. Bleeding has been extolled by some celebrated phy-

* The property which water has of dissolving rapidly the watery extract of Opium contained in the stomach, furnishes us with an answer to an observation which might be made to us; viz; *if the experiments tried by introducing the vinegar of commerce into the stomach of dogs that have taken the extract of Opium, hastens death, does the same thing take place when vinegar simply diluted with water is administered, and the poison has not been expelled by vomiting?*—We are of opinion, in consequence of a very great number of facts, that it is still dangerous to employ vinegar and water; because this acidulated drink dissolves better the Opium, than water would do alone, and consequently that the absorption is more energetic.

sicians, for curing the disease produced by Opium. *Tissot* says: "if it should happen that by imprudence, by mistake, by ignorance, or by evil design, that too great a quantity of Opium, or of any other preparation into which it enters, shall have been taken; such as theriaca, mithridate, diascordium, liquid laudanum, &c. the patient must be immediately *bled*, and treated in every respect as if he had a sanguineous apoplexy, made to respire a great quantity of vinegar, and to drink plenty of vinegar and water." (Avis au *peuple*, tom. ii. §. 535, p. 280, 7^e^ edit.) Several practitioners have remarked that Opium acts with less energy when administered to persons who have lost a great quantity of blood. These considerations engaged us to make the following experiments.

Experiment 1st. At three quarters past eight, thirty-three grains of the watery extract of Opium, dissolved in a drachm and half of water, were applied to the cellular texture of the inside of the thigh of a robust dog of middle size. Half an hour after, the animal was under the influence of the poison: one of the veins of the posterior extremities was opened, and three ounces of blood taken away. At half past ten, the animal was sensibly better: he was bled again. A quarter of an hour after, he walked about freely in the laboratory. At one, he was again bled. The next day he appeared recovered.

Experiment 2nd. At three quarters past eight, the experiment was commenced again on a strong dog. At a quarter past nine, he was sleepy, and the posterior extremities appeared completely paralyzed: a vein of one of the posterior extremities was opened, and two ounces of blood drawn. Twenty minutes after, convulsive movements. At ten, a fresh bleeding; but it was impossible to obtain more than one ounce of blood. At half past eleven, the animal was in a dangerous situation; it was attempted in vain to bleed him, and he expired at one o'clock.

Experiment 3rd. Bleeding at the anterior and posterior

extremities, was practised upon four other animals poisoned by the same dose of the watery extract of Opium, which had been applied to the cellular texture of the inside of the thigh. Two of them died nearly in the same manner as if they had not been bled. The two others were alive two days after, and presented scarcely any symptom of poisoning. They died the third day, because they were neglected.

Experiment 4th. At seven in the morning, the right jugular vein of a small robust dog was opened, and fourteen ounces of blood were drawn. Immediately after, thirty-three grains of the watery extract of Opium, dissolved in two drachms of water, were applied to the cellular texture of the posterior extremity. At a quarter past eight, the animal was under the influence of the poison; but the symptoms were not so severe as in another animal much stronger, which had not been bled, and to which the same dose of the extract had been applied at ten minutes before eight. At nine, convulsive shocks, which might be compared to the movements impressed on frogs, by the electric fluid disengaged from the pile of Volta. This animal was nevertheless capable of supporting himself for some time on his feet, whilst the other had the posterior extremities completely paralyzed. At half past nine, three ounces more blood were drawn from the jugular vein. At eleven, lying down on the side, impossibility of standing, continual trembling, *(another bleeding of two ounces)*: immediately after, respiration slow, and laborious; the other symptoms acquired a greater violence, and he died at half past twelve. It is evident that this animal lived at least as long as if he had not been bled.

Experiment 5th. At seven in the morning, thirty grains of the watery extract of Opium, dissolved in two drachms of water, were applied to the cellular texture of the inside of the posterior extremity of a small strong dog: half an hour after, the animal was under the influence of the poison; four ounces of blood were drawn from the jugular vein. At six in the

evening, the bleeding had been repeated five times. At nine, he was very well. The next morning, two basons of broth were given him, and he was perfectly recovered.

Experiment 6th. At eight o'clock, the same experiment was begun on a dog of middle size, half an hour after, he was under the influence of the poison: four ounces of blood were drawn from the jugular vein. At a quarter before nine, convulsive movements. At half past ten, the symptoms appeared somewhat diminished *(another bleeding of three ounces)*. At twelve, decidedly better: at two in the same condition. The animal ceased to be taken care of, and died at five o'clock. In two other instances, the dogs submitted to this experiment, died about the same period at which they would have died, had they not been bled.*

904. It results from these considerations.

1st. That bleeding has never aggravated the symptoms of poisoning by Opium, nor accelerated the moment of death.

2nd. That it has appeared useful in some instances, and even has sufficed to restore the animals, which would have died if it had not been put in practice.

3rd. That it appears to us, that it ought to be performed on plethoric and robust persons, who may be under the influence of Opium.

4th. Lastly, that it is more advisable to open the jugular vein, than any other.

905. The detailed examination, which we have just given of the value of each of the means proposed, for combating the poisoning in question; permits us to trace out the steps which the physician called in to a case of this kind ought to pursue.

* These experiments were repeated under my eyes by Dr. Rousseau, my friend and pupil, who made them the subject of an inaugural dissertation sustained by him before the faculty of medicine at Paris, in the month of August, 1815.

1st. *He will favour the expulsion of the Opium, by vomiting,* by making the patient swallow strong emetics, such as are capable of exciting the contractility of the stomach: these are, the antimoniated tartrate of potash in the dose of five or six grains; the sulphate of zinc in the *dose of from fifteen to eighteen grains;* or the sulphate of copper, in the dose of three or four grains; this last salt administered in a stronger dose, might be capable of occasioning death by producing the inflammation of some portions of the digestive canal, as we have already observed in several experiments made on this subject. Should these means prove insufficient to provoke vomiting, and there was a certainty of the person having taken a strong dose of Opium, might not one or two grains of tartarized antimony, dissolved in one or two ounces of water, be injected into the veins?—These means would probably induce vomiting, and the expulsion of the Opium, which, without that, would have been absorbed, and have proved fatal.

2nd. *The dissolving these emetics in a large quantity of water must be avoided, or filling the stomach with fluid, whether mucilaginous, acid, or even watery, with the design of expelling the Opium.* In fact, these fluids do not always produce vomiting, and they possess the great inconvenience of dissolving the poison, and facilitating its absorption.

3rd. *A bleeding should be instituted from the jugular vein immediately after the expulsion of the poisonous substance, which should be repeated according to the temperament of the patient.*

4th. *Then there should be administered alternately water, acidulated with vinegar, lemon juice, tartaric acid, and a strong infusion of hot coffee;* these drinks should be given in a small dose, which should be frequently repeated, for instance, every ten minutes. We are convinced that it would be dangerous to administer the acidulated drinks before the expulsion of the poison.

5th. Glysters of camphor may be employed every twelve hours. Care should be taken to warm frequently the patient's bed, and to rub his arms and legs roughly.

6th. If the patient should have taken the Opium some time, and there be a suspicion that it might be found in the large intestines, recourse should be had to purgative glysters.

906. The precepts which we have just established, differ from those found in Bulliard, and in some other works treating on the mode of curing poisoning by Opium; however, we are certain that the means which we propose are salutary: we have often employed them in animals poisoned by a dose of Opium so strong, that they would have died at the end of two or three hours; and have succeeded in curing them. It is true, our experiments have been made upon dogs, and it may be objected to us, that the results might be different in the human species. This objection appears to us to be ill founded, for Opium is absorbed, and produces the same effect on men as on dogs. The means then proper for combating them, cannot be different. Beside, we are convinced, that the difference which may exist between these two species of animals with regard to the mode of action which poisonous substances exert, has been singularly exaggerated. We dare to affirm, after having made more than two thousand experiments upon dogs, and compared them with what is observed in the human species, *that this difference is null with regard to the nature of the symptoms which poisons produce, and to the manner in which they ought to be combated; that it exists only in the doses necessary for carrying the disease to the same degree, in the influence of the moral powers, and in the relative strength of the animals,—circumstances which can produce an influence only on the violence of the symptoms, and on the duration of the disease.*

907. Poisoning by henbane, nightshade, and the other narcotic poisons of this class, except the prussic acid, ought to be combated as we have just described, when speaking of Opium.

908. *Prussic Acid.* *M. Coullon,* who has made some researches respecting the remedies proposed for curing the poisoning by this acid, has ascertained: 1st. That the oil of olives does not oppose the effects produced by prussic acid; 2nd. That the same may be said with respect to milk; 3rd. That ammonia affords a feeble relief to this kind of poisoning; 4th. The same thing happens with respect to theriaca; 5th. Lastly, that Chlorine (oxygenated muriatic acid) is a feeble remedy.

The professor *Emmert,* whose medical knowledge is so extensive, has made numerous researches respecting the antidotes of the prussic acid, and has been desirous of communicating to us the result of his labours, which he has not yet published. "I have not yet been able to discover," says he, "any antidote for the prussic acid. The caustic potash does not oppose in any manner its effects, nor those of the water of the laurel, or of bitter almonds; phenomena so much the more extraordinary, as these two last fluids lose their poisonous properties when they are treated by the muriate of iron and potash; now, there is iron in the caustic potash. *Fontana* had already observed, that the *Lapis infernalis* (potash with lime), combined with the oil of laurel, did not prevent this latter from acting, whether it was administered internally, or applied externally. Amongst all the medicines I have employed, the *oil of turpentine* appears to be that which acts the most powerfully in combating the effects of these poisons. The same considerations may be applied to the *oil and to the bark* of the *prunus padus,* the action of which on the animal economy is the same as that of the prussic acid."

909. It results from these facts that the physician, who is called in to a case of poisoning of this kind, should hasten to administer a strong emetic; after which he should employ the oil of turpentine, and all the stimulants capable of exciting sensibility and contractility.

CHAPTER V.

Class 5th. OF THE NARCOTICO-ACRID POISONS.

910. The name of *Narcotico-Acrid* poisons has been given to such as are endued with an acrid and nauseous taste, and which act at the same time as narcotics and rubefacients. We will shew hereafter how little the denomination of *Narcotico-Acrid* is applicable to the major part of the poisoning substances of this class; for, 1st, their narcotic effects are almost always the result of the strong excitement they produce at first; 2ndly, some of them do not produce any rubefaction on the texture to which they are applied.

OF THE BELLADONNA.

911. The *Belladonna* is a plant of the family of the *Solana*, arranged by Linnæus in the Pentandria Monogynia.

Calyx monophyllaus, bell-shaped, permanent, half-divided into five pointed segments: corolla campanulated, twice as long as the calyx, monopetalous, of a dirty red or ferruginous colour, with a border bellying out, and divided into five lobes almost unequal; five stamina, the filaments of which are filiform: one style somewhat inclined, terminated by a headed stigma: one germen superior, egg-shaped, which, when ripe, appears in the form of a berry almost round, surrounded at its base by the calyx, of a black colour, and divided internally into two

cells, each one containing several oval or kidney-shaped seeds, attached to a fleshy placenta, or simply embedded in the pulp; the placentas adhere to the divisions of the cells by means of a small membrane: the embryo of the seeds is nearly circular, situate near the middle of the perisperm: flowers axillary, borne on short peduncles: stalk, from six to nine decimetres in height, hairy, and very branchy: leaves oval, very entire, frequently double, and of unequal size. This plant grows in large ditches, and on the edges of hilly woods.

ACTION OF BELLADONNA ON THE ANIMAL ECONOMY.

Experiment 1st. Thirty ripe berries of Belladonna were administered to a small dog: the animal experienced nothing.

Experiment 2nd. At eight in the morning, half an ounce of the watery extract of *Belladonna*, prepared by evaporating in a water-bath the fresh juice of the plant, and dissolved in an ounce and half of water, was introduced into the stomach of a robust dog of middle size: the œsophagus was tied. At half past eight, efforts to vomit, remarkable agitation. At five minutes after nine, fresh efforts to vomit, plaintive cries, posterior extremities beginning to grow weak. At half past ten, continual acute cries, posterior extremities still weaker. These symptoms increased in violence, and the animal died at a quarter before twelve. He was opened the next day. The inferior lobe of the right lung was dense, of a livid colour, and but little crepitating; the other lobes presented the rosy hue which is natural to them; the heart contained coagulated blood; the mucous membrane of the stomach was of a red colour throughout its whole extent, but it was not very much inflamed.

Experiment 3rd. Twenty grains of the watery extract of *Belladonna*, dissolved in two ounces of water, were introduced into the stomach of a young cat. A short time after,

the animal threw up by vomiting, about the third part of the fluid ingested. At the expiration of thirty-five minutes, it staggered in walking. A quarter of an hour after, it was not able to make a single step without falling; the pupils were dilated; the animal lay down upon its side, and when made to walk, appeared completely intoxicated; but it preserved its sensibility. Five hours after the ingestion of the poison, it was perfectly recovered. *(Experiment communicated by M. Brodie.)*

Experiment 4th. At half past one, a robust dog was made to swallow four drachms of the same extract, dissolved in five drachms of distilled water, and prepared by an apothecary: the œsophagus was then tied. At three, the animal had not presented any remarkable symptom. At six, he uttered acute and almost continual cries, was very restless, his motions were slow; but he had no vertigo. The next morning, at ten o'clock, his pupils were excessively dilated, he continued to moan, and remained quiet, unless when forced to walk: he then made a few steps without wavering; the head appeared heavy, and was inclined on the breast. At six in the evening, he was drowsy, staggered much in walking, and resembled a person drunk with wine; he uttered plaintive cries. He died at nine the same evening. The mucous membrane of the stomach was scarcely red, but it presented about the centre, four small ulcers; the intestinal canal was sound; there were, on the edge of the inferior lobes of the lungs, several blackish spots; the ventricles of the brain contained no serosity; the veins distributed over the external surface of this viscus were distended with blood; the pia mater was somewhat injected.

Experiment 5th. At eight in the morning, a wound was made in the inside of the thigh of a dog of middle size; two drachms of this extract, prepared by the same apothecary, were placed in contact with the cellular texture: the lips of the wound were united by suture. At the end of twelve

minutes, the pupils were already very much dilated; the animal appeared somewhat agitated, and turned round perpetually, describing a small circle tolerably regular; the pulsations of the heart were extremely frequent. At nine, his head was heavy, there was a tendency to sleep; the hind feet appeared somewhat weaker; the other symptoms continued; at two, he was much in the same state. At eight in the evening, he appeared to ail nothing. The next morning, he was found dead. The wound was tolerably inflamed, without any slough; the limb operated on was very considerably infiltrated; the digestive canal sound; the stomach contained some half-digested aliments (the animal had not vomited); the ventricles of the heart contained a little blood, partly fluid, partly coagulated; the lungs, which were of a deep red colour, presented here and there blackish spots; their substance was a little distended with blood of a black colour; it was nevertheless sufficiently crepitating.

Experiment 6th. The same experiment was begun again at six in the evening, and two drachms of the same extract, slightly moistened, were employed: the animal died in the night. The following day, at five in the morning, a small strong dog was submitted to the same experiment, and two drachms of the same extract were employed, dissolved in a drachm of distilled water. Twenty minutes after, the animal appeared to suffer; he ran backwards and forward uttering continual complaints: the pulsations of the heart were regular, strong, and frequent; his pupils were dilated. At half past six, he continued to complain, and to be agitated; his head appeared heavy. At nine, he was extremely ill; his posterior extremities grew weak; he could with difficulty support himself; he wavered in walking; his cries were more acute; the dilatation of the pupils was extreme; respiration difficult, and somewhat accelerated; the pulsations of the heart as before; the senses were less susceptible of impressions. He died at eleven. At twelve, he was opened. The feet

were stretched out and stiff; the heart contained in its cavities some clots of blackish blood (the animal was still tolerably warm); the lungs appeared a little less crepitating than in their natural state; in the ventricles of the brain, there was only one atom of serosity; the vessels of this organ were only slightly injected; the digestive canal appeared sound; the infiltration of the limb operated on was very remarkable; and there was much coagulated and extravasated blood.

Experiment 7th. Thirty grains of the same watery extract, dissolved in six drachms of water, were injected into the jugular vein of a small dog. Three minutes after, the animal began to have a tendency to drowsiness. At the end of two minutes more he vomited some glairy matter, and experienced slight vertigoes; his posterior extremities were weak; the right pupil extremely dilated. He was perfectly recovered six hours after the injection.

Other dogs died on injecting into the jugular vein forty or five and forty grains of the watery extract of *Belladonna*.

Experiment 8th. We have repeated the preceding experiments, with the same quantity of the extract of *Belladonna*, bought of other apothecaries, and have obtained effects not very decided, which, without doubt, depends on the manner in which the extracts have been prepared.

Observations.

1st. A child, four years of age, of a weak constitution, but in other respects in good health, ate, on the twenty-seventh of October, at eleven o'clock, a tolerably large quantity of the berries of *Belladonna*. He was seized immediately after with loathings, retchings, vomitings, drunkenness, a slight delirium, and an inextinguishable thirst. The physician, who was called in, judged that it was a case of poisoning. It was five in the evening when he saw the child for the first time, and already tumefaction and redness of the face and lips were discernible, with distention of the eyelids, dilatation of the

pupil, insensibility of the eyes, convulsive state of the jaw, of the muscles of the face, and of the extremities; delirium, &c. &c.; the pulse was extremely weak, the breathing irregular. The physician ordered half a drachm of ipecacuanha and of sugar in powder, mixed and divided into eleven doses. One of these was given every half hour. Vomitings took place, which brought up in several portions four berries of *Belladonna*, and a great quantity of the gastric juice coloured by the juice of the plant. At eleven at night, *Dr. Munniks* was called in, with his father, and Professor *Fellingue*. The patient had taken, beside the ipecacuanha, a drink composed with honey, water, and vinegar: he was extremely drowsy, although agitated by convulsive movements; livid spots were perceived over the surface of the body; the sweats were profuse. The child vomited again in their presence, and brought up a berry of the *Belladonna:* they caused the legs and feet to be covered with cataplasms, composed of rye-flour and vinegar; and a mixture composed of water, vinegar, simple oxymel, and dulcified spirit of nitre, was prescribed, to be taken by the half ounce every hour. On the 28th of October increase of the convulsive movements, redness of the face, and sweats; the pupil remained dilated, and there was beside a rigidity in the spine of the back, tumefaction of the abdomen, which was extremely sensible to the touch; constipation, small pulse. A purgative draught was prescribed, with tamarinds, senna, and simple oxymel. In the evening an oily glyster was given; the constipation ceased, and all the symptoms appeared diminished. The 29th, in the morning, he continued better; the mixture with the vinegar and water was continued: in the afternoon the delirium returned, with tumefaction of the abdomen and constipation; *Aphthæ* likewise made their appearance: the purgative draught was repeated. In the evening there was fever, agitation with drowsiness; the patient complained besides of pains in the teeth: the draught with vinegar and oxymel was repeated. Such a degree

of quiet was established, that on the 13th the constipation had ceased, the appetite was returned, and in fine the patient entered upon his convalescence. From the 31st of October to the 4th of December, a perfect cure was obtained by the continuance of the same means.*

2nd. Some children ate in a garden the fruit of the *Belladonna*. Shortly after they had a burning fever, with convulsions, and very strong palpitations of the heart; they lost their senses, and became completely delirious; one of them, four years of age, died the next day: the stomach contained some berries of the Belladonna crushed, and some seeds; it exhibited three ulcers; the heart was livid, and the pericardium without serosity.†

3rd. The following are the symptoms experienced by above a hundred and fifty soldiers, who were poisoned by the berries of the Belladonna, which they gathered at Pirna, near Dresden.

" Dilatation and immobility of the pupil; insensibility, almost complete, of the eye to the presence of external objects; or at least confused vision: injection of the conjunctiva by a bluish blood; protrusion of the eye, which in some appeared as if it were dull, and in others ardent and furious; dryness of the lips, tongue, palate, and throat; deglutition difficult, or even impossible: nauseas not followed by vomiting; sensation of weakness, lipothymia, syncope; difficulty, or impossibility of standing; frequent bending forward of the trunk; continual motion of the hands and fingers; gay delirium, with a vacant smile; aphonia, or confused sounds uttered with pain; probably ineffectual desires of going to stool; insensible restoration to health and reason, without any recollection of the preceding state. (*Journal de Sedillot*, Decembre, 1813, p. 364, observ. de *M. E. Gaultier de Claubry.*)

* *Journal General de Médecine*, liv. xxiv. p. 224.

† *Histoire de l'Academie des Sciences Annee*, 1706. Article *Botanique*.

4th. *Wepfer* relates an observation of a child, ten years old, who experienced symptoms similar to those which form the subject of the preceding observations, after having eaten some berries of the Belladonna. (Op. citat. p. 227.)

5th. One child ate four ripe berries of the *Belladonna*, another ate six. Both one and the other were guilty of extravagances which astonished the mother; their pupils were dilated; their countenances no longer remained the same; they had a cheerful delirium, accompanied with fever. The physician being called in found them in a state of great agitation, talking at random, running, jumping, laughing *sardonically*; their countenance purple, and pulse hurried. He administered to each of them half a grain of emetic tartar, and a drachm of Glauber salt, in four or five ounces of water: they had copious evacuations during seven or eight hours, and the symptoms disappeared.*

6th. *Mappi* says, that the wine of *Belladonna* gave rise to a universal gangrene, which was followed by death. (*Plant. Alsat.* p. 36.)

912. The facts above detailed permit us to conclude:—

1st. That the *Belladonna* and its extract possess poisonous properties, extremely energetic.

2nd. That they exert a local action not very violent; but that they are absorbed, carried into the circulation, and act upon the nervous system, and particularly on the brain.

3rd. That they produce symptoms common to some other poisons, which are insufficient to characterize that species of poisoning, notwithstanding what has been advanced on that subject by many authors.

4th. That the extracts of commerce vary singularly with respect to their energy, according to the manner in which they have been prepared; and that the most active are *those which*

* *Gazette de Santé*, 11 Thermidor, an. xv. p. 503.

have been obtained by evaporating with a very gentle heat, the juice of the fresh plant.

5th. That their action is much more violent, when injected into the veins, than when they have been applied upon the cellular texture; and by a still stronger reason, than in the case where they have been introduced into the stomach.

6th. That these preparations appear to act on the human species in the same manner as upon dogs.

OF THE *DATURA STRAMONIUM.*

913. The *Datura Stramonium* is a plant of the family of the *Solana,* arranged by Linnæus, in the pentandria monogynia.

Calyx large, tubular, bellied, with five angles and five divisions; permanent at its base; corolla very large, monopetalous, in shape of a funnel, of a white or violet colour, the tube insensibly dilating, longer than the calyx, having a border with five folds, and five acuminated teeth; five stamina; one style with a thick stigma, having two layers; superior germen rounded, and grooved with four furrows: the fruit is a capsule, having four valves, rounded, covered with curved points, straight and thick; quadrilocular inferiorly, bilocular superiorly, and containing a very great number of kidney-shaped seeds, the embryo of which is nearly circular, and placed in the midst of the perisperm. Stalk from nine to twelve decimetres in height, round, hollow, and extremely branchy: leaves petiolated, smooth, broad, angular, and pointed. This plant is fond of fat and moist lands; it is found by the side of roads, and in cultivated places.

ACTION OF THE *DATURA STRAMONIUM* ON THE ANIMAL ECONOMY.

Experiment 1st. At half past nine in the morning, half an

ounce of the watery extract of *Datura Stramonium*, prepared by an apothecary, and dissolved in six drachms of distilled water, was introduced into the stomach of a robust dog of middle size: the œsophagus was tied. At the end of six minutes, the animal made some efforts to vomit, and was extremely agitated; he ran about the laboratory, and endeavoured to make his escape, uttering plaintive cries. An hour after, he had already tried twelve or fifteen times to vomit; his posterior extremities were a little weak, but he still preserved the power of walking about freely; his breathing was accelerated at intervals; the pulsations of the heart were strong and frequent, and he continued to moan. At three quarters past ten, he was a little drowsy; the weakness of his legs increased, and he preserved the use of his senses. At eleven, the posterior extremities bent, and he fell down on his side, but he shortly after rose again; he already staggered a little in walking. At half past four, continuation of the complaint, vertigoes very decided. He died in the night.

Dissection. The stomach contained about six ounces of a bloody fluid; the mucous membrane, which was of a bright red throughout its whole extent, presented on the folds which it forms near the pylorus, a very great number of black bands, which were longitudinal, about a line in breadth, and which were only blood extravasated between this membrane and the subjacent coat; this latter was of a cherry red in the places corresponding with these bands: the rectum, which was without alteration, was lined with a black stringy matter; the lungs were of a deep red in several places, and distended with black and fluid blood; the ventricles of the brain contained no fluid; the external veins of this organ were injected and distended.

Experiment 2nd. At eight in the morning, an incision was made in the inside of the thigh of a small strong dog; two drachms of the watery extract of Datura Stramonium, almost solid, were brought in contact with the cellular texture, and the

lips were united by a few stitches. At five in the evening, the animal had not presented any remarkable phenomena. The next morning he was found dead. The wound was not much inflamed; the lungs presented some spots of a livid red colour, distended with black fluid blood; the ventricles of the heart contained also some fluid and black blood; the digestive canal was sound; the body was stiff, contracted, and extremely cold.

Experiment 3rd. The same experiment was repeated at six in the evening, and two drachms of extract slightly moistened were employed: the animal died in the night. The following day, at five in the morning, a small dog, tolerably robust, was submitted to the same experiment. The two drachms of extract were recently prepared and diluted with a drachm and half of distilled water. Half an hour after the operation, the animal uttered plaintive cries, he was agitated, and ran several times over the laboratory; his pupils were dilated. At half past six he was in the same state; the pulsations of the heart were strong, frequent, and tolerably regular; he preserved the free use of his senses, and of his motive faculty. At nine, he still was uttering acute cries, his posterior extremities were extremely weak, so also his walk was slow and uncertain; his head, which was heavy, was inclined, and almost touched the ground; the dilatation of the pupils was carried to as great a degree as possible, nevertheless he saw and heard well: the pulsations of the heart continued to be strong and frequent. A quarter of an hour after, the vertigoes were increased and the cries continued; the animal had passed no evacuations. He died at three quarters past eleven. He was opened ten minutes after twelve. The limbs were flexible; the heart contained a very great number of blackish clots (the body was nevertheless extremely hot); the lungs presented no sensible point of alteration; the case was the same with the digestive canal; the ventricles of the brain were empty, and there was no fulness in the vessels of this organ; the limb operated on was somewhat inflamed.

Experiment 4th. Fifteen grains of the same extract, dissolved in four drachms of water, were injected into the jugular vein of a very strong dog. At the end of two hours, the animal uttered some cries, and vomited twice some bilious matter. He made his escape in the night, and was seen alive two days afterwards, on the roofs of the houses adjoining to the laboratory.

Experiment 5th. The same experiment was repeated upon a small robust dog, with thirty grains of extract. At the same moment the animal stretched out his feet, and uttered plaintive cries; his head was reflected upon the back, and he fell down insensible. He died at the end of four minutes. The opening of the body took place immediately; the ventricles of the heart were no longer contracting; the auricles exhibited some extremely distinct pulsations; the blood contained in these organs was fluid; that contained in the aortic cavity was of a vermillion red; the lungs were only slightly shrivelled.

Observations.

1st. *Swaine* relates, that the decoction prepared with three capsules of Stramonium and milk, produced paralysis of the whole body, and the patient became mad; he remained in that state during seven hours; then he came to himself, and slept quietly during the night. (Swaine, *Essays and Observat. Physiol. and Litter.* vol. ii. p. 247.)

2nd. A man having drunk some decoction of the fruit, became melancholy; lost his voice; his pulse disappeared; his limbs were paralyzed; after which he went into a fit of madness. Another having drunk some milk boiled with the same fruit, experienced vertigoes, became insensible, talked at random; had a pulse, at first small and quick, afterwards scarcely sensible; his legs were paralyzed; and at last, he became mad. (Vicat, op. citat. p. 240.)

3rd. In collecting together all that has been written on the effects of this plant, upon the human species, by *Haller*,

Krause, Storck, Sprægel, Plehwe, and *Triller;* it may be said that it has produced intoxication, delirium, loss of sense, drowsiness, a sort of madness and fury; loss of memory, sometimes transitory, sometimes permanent; convulsions, paralysis of the limbs, cold sweats, and excessive thirsts and tremblings. *Haller* opened the body of a woman, who had taken the seed of this plant, believing it to be that of Gith. The cortical substance of the brain was full of blood; and there were some hard clots in the cavities of the cranium.

The *Datura Metela, Tatula,* and *Ferox,* are also poisonous. *Gmelin* says, that beer poisoned by the seeds of the *Datura Ferox,* has given rise to a delirium, which lasted four and twenty hours.

914. The conclusions to be drawn from these experiments are entirely analogous to those which we have given at the end of the article on the *Belladonna,* a plant which equally belongs to the family of the *Solana;* the *Datura* appears however to excite more strongly the brain, and to produce a more violent general action.

OF TOBACCO.

915. Tobacco (Nicotiana Tabacum) is a plant of the family of the *Solana,* arranged by *Linnæus* in the Pentandria Monogynia.

Characters. Calyx of one single piece, in shape of a cup, cut into five segments, acute, and slightly hairy; corolla monopetalous, in shape of a funnel, of a purplish rose colour, or ferruginous, with a tube twice the length of the calyx, with a plain border, opening like a cup, and having five divisions, equal, short, and pointed: five stamina close to the stigma before fecundation, forming a kind of crown; but which recedes when this organ has been fecundated: capsule egg-shaped, conical, grooved with four streaks, with two cells opening at the top in four parts, and containing a great num-

ber of very fine seeds; the embryo of the seeds is curved, and placed in the axis of the perisperm: flowers in a panicle, at the extremity of the branches; stalk, from four to five feet high, cylindrical, strong, thick as the thumb, slightly hairy, and full of marrow: leaves large, oval, lanceolated, sessile, and even prolonged upon the stalk, on each side of their insertions; their summit is acute, edges slightly undulated, surface hairy, with ribs very apparent; their colour, a little yellowish, or of a pale green. The root is fibrous, branchy, white, and of a strong acrid taste.

ACTION OF TOBACCO ON THE ANIMAL ECONOMY.

Experiment 1st. At eight in the morning, five drachms and a half of rappee snuff, were introduced into the stomach of a robust dog of middle size, and the œsophagus was tied. A few minutes after, the animal made some efforts to vomit. At a quarter past two, he walked very slow, experienced slight vertigoes, and exhibited a continual trembling in the posterior extremities; the organs of sense appeared to enjoy all their faculties; the breathing was a little accelerated. At ten minutes after four, he was lying on the side, and could no longer support himself on his feet; however, he made from time to time ineffectual efforts to raise himself; his head was heavy, and exhibited a continual trembling; his countenance bore the marks of stupor; the muscles of the cervical vertebræ were agitated with slight convulsive movements; the limbs were flaccid; the organs of sense appeared less susceptible of impression than in the natural state. The breathing was excessively deep, impeded, and accelerated; the pulsations of the heart were frequent and somewhat strong. He died at five o'clock; the next day he was opened. The lungs were livid throughout their whole extent; their texture was more dense than in the natural state, and they sunk a little in water; the

heart contained a few clots of black blood; the stomach contained a great part of the snuff ingested; it presented only a few reddish points; the rest of the digestive canal was sound; the body was flaccid.

Experiment 2nd. At two o'clock, an ounce of rappee snuff was introduced into the stomach of a dog of middle size, and the œsophagus was tied. A few minutes after, the animal made efforts to vomit; at four, he experienced no remarkable symptom: he died in the night. The mucous membrane of the stomach was of a bright red throughout its whole extent; the other portions of the digestive canal appeared sound. The lungs were livid, distended with blood, much more dense than in their natural state, and presented a great number of black spots. The greater part of the snuff was found in the stomach.

Experiment 3rd. At a quarter past eight, two drachms of rappee snuff and two drachms of water, were applied to the cellular texture of the inside of the thigh of a dog of middle size. Ten minutes after, the animal vomited. At half past eight, he made fruitless efforts to vomit, and began to experience some very slight vertigoes; his posterior extremities exhibited a tolerably decided trembling; his countenance appeared astonished. At a quarter before nine, the trembling was become general; the posterior limbs were somewhat weak; his walk very vacillating. Five minutes after, the animal was lying down on the belly;* his posterior extremities were elevated; the anterior bent; and he endeavoured, by making movements in every direction, to right himself, striking his head against the ground; he continued to tremble. A few moments after, he lay down on the side in a state of great relaxation. At twenty minutes after nine, his limbs were agitated at intervals with convulsions tolerably strong; the organs of sense were as susceptible of impressions as before the ex-

* The position of the animal appears to have been evidently upon the back, to answer the description given.—TRANSLATOR.

periment; his breathing was not impeded. He died at forty minutes after nine.

Experiment 4th. At two o'clock, sixteen grains of rappee snuff, and two drachms of water, were applied to the cellular texture of the inside of the thigh of a robust dog. Ten minutes after, the animal vomited twice. At six, he began to experience slight vertigoes, and a trembling in the posterior extremities; he died in the night. The lungs were of a deep red colour, and exhibited here and there livid spots; their texture was somewhat more dense than in their natural state: there was no alteration in the digestive canal; the limb operated on was very little inflamed.

Experiment 5th. Being desirous of knowing whether the active part of the rappee snuff resides in the portion which is soluble in water, or in that which is insoluble, the preceding experiment was begun again with four drachms of this powder, which had been treated eight different times, by a great quantity of boiling water, in order to exhaust it completely. Before uniting the lips of the wound by suture, four drachms of water were introduced. Forty-eight hours after, the animal had not experienced any remarkable symptom; he died at the end of the third day: nothing had been given him to eat, and he was feeble.

Experiment 6th. An ounce of the dried leaves of tobacco were boiled for an hour with six ounces of water; the fluid was filtered, and reduced to three ounces and a half by evaporation; it was introduced into the stomach of a robust dog of middle size, and his œsophagus was tied. Three minutes after, the animal made efforts to vomit, which he repeated several times during the first hour; he expired three hours after the ingestion of the fluid into the stomach, and experienced the symptoms related in the third experiment. He was opened the next day. The stomach was slightly inflamed; the intestinal canal did not appear altered; the lungs presented a very great number of patches of a livid colour, and very

broad ; their texture was more dense than in their natural state, and distended with blood.

Experiment 7th. The infusion of tobacco, prepared with five ounces of water, and half an ounce of the dried leaves, did not produce any accident in a robust dog of middle size.

Experiment 8th. *M. Brodie* injected into the rectum of several dogs, and one cat, from one to four ounces of a strong infusion of tobacco : these animals became insensible, motionless, and all died in less than ten minutes ; the pulsations of the heart were no more sensible a minute before death ; one of them only vomited. Their bodies were opened immediately after death ; the heart was very much distended, and no longer contracted ; in one case only after having cut into the pericardium, the auricles and ventricles, irritated by the instrument, began to contract with some force, and the circulation was capable of being prolonged for half an hour, by means of the sufflation of air into the lungs.

Experiment 9th. Eight ounces of decoction of tobacco were administered in the form of a glyster to a strong dog : this decoction had been prepared by boiling one ounce of smoking tobacco in nine ounces of water. Three minutes after, the animal rejected the fluid and vomited. During the first half hour, he did not cease to make violent and fruitless efforts to vomit ; in other respects, he suffered no inconvenience whatever ; the next day his health appeared restored. It is certain, this animal would have died, had he retained the glyster any longer.

Experiment 10th. *M. Brodie* applied upon the tongue of a young cat, one drop of the empyreumatic oil of Tobacco :* immediately all the muscles experienced violent convulsions, and the breathing was accelerated. Five minutes after, the animal became insensible, lay down on the side, and presented

* This oil had been obtained, by distilling the leaves of Tobacco, at the temperature of about 80°, R., and separating it from the water, on the top of which it was found after the distillation.

from time to time slight convulsive movements. A quarter of an hour after, it appeared recovered. The experiment was begun again, and the animal died at the end of two minutes: the thorax was instantly opened; the heart was contracting regularly and with force; the blood was of a dark colour. A tube was introduced into the trachea, for the purpose of conveying air into the lungs; the contractions of the heart were stronger and more frequent, and did not diminish at all during six minutes that the sufflation was continued; the tongue and brain presented no alteration.

Experiment 11th. One drop of the same oil, held in suspension by means of mucilage, in an ounce and half of water, was injected into the rectum of a dog. Two minutes after, the animal became weak, and made fruitless efforts to vomit. Twenty-five minutes after, he appeared recovered. The injection was repeated: he experienced instantly the symptoms related in experiment 10th, and died at the end of two minutes and a half. My friend *M. Macartney,* a learned professor of the school of Dublin, was so good as to communicate to me during his stay at Paris the following experiments, which he made some time since.

Experiment 12th. The upper part of the cranium, and a portion of the membranes, of the brain of a rabbit, were raised up: when the blood had ceased to flow, a few drops of the empyreumatic oil of tobacco were applied upon the surface of the encephalon. Half an hour after, the animal had not experienced any remarkable symptoms. It was then killed, by putting two drops of the same oil upon the tongue.

Experiment 13th. About half a scruple of this poison was introduced into the hemispheres of the brain of another rabbit, which had not produced any effect thirty minutes after. The animal was killed instantly, by the application of three drops of the same oil upon the tongue.

In other experiments, the animals experienced convulsions, and died in a short time, when the oil was introduced as far as

the *Pons Varolii;* but these accidents depended on a mechanical effect, for they took place equally when the instrument only was introduced, by means of which the empyreumatic oil had been first inserted.

Experiment 14th. The sciatic nerve of a rabbit was isolated from the surrounding parts, and touched several times with this poison; no accident resulted from it. In another experiment this nerve was isolated, transversely cut, and each of the extremities plunged into a small vessel of lead, containing a certain quantity of this empyreumatic oil. An hour after, the animal had not experienced any inconvenience, whilst he was instantly killed by the application of one or two drops on the tongue.

The same results were obtained by the essential oil of bitter almonds. Mr. Macartney made these experiments in support of a very great number of others which he proposes to publish, and which prove that the sensibility of the nerves resides in the extremities of the branches, and that the brain, which is the organ of perception, does not enjoy, in the habitual state of health, any sensibility.

Experiment 15th. At noon, a drachm of the watery extract of *Nicotiana Rustica* was applied to the cellular texture of the inside of the thigh of a small dog. Six minutes after, the animal uttered plaintive cries, and vomited some yellow matter. Twenty minutes after twelve, fresh vomiting, continuation of the complaints; at the end of two minutes, fruitless efforts to vomit. At one, the pulsations of the heart were accelerated as much as before the application of the poison. The next day, at three in the afternoon, he refused food; all his muscles were affected with a slight trembling; he was somewhat dejected. He died in the night. The mucous membrane of the stomach was of a colour nearly natural; but it presented near the pylorus, two black spots the size of a stout pin's head, the centre of which was ulcerated; the lungs exhibited

several livid spots containing, in their interior, some blackish blood.

Experiment 16th. The same experiment was repeated with a drachm and six grains of the same extract. At the end of fifteen minutes, the animal vomited several times, and made complaints. Thirty-six minutes after the application of the poisonous substance, he experienced very considerable vertigoes; he sunk into a state of general insensibility, and died eighteen hours after the operation. It was impossible to discover the least vestige of alteration in the digestive canal, lungs, or brain.

Observations.

1st. A woman applied to the heads of three children, who had the tinea, a liniment prepared with the powder of tobacco and butter: soon after they experienced vertigoes, violent vomitings, and faintings: they had profuse sweats. During twenty-four hours they walked as if they were drunk. (*Ephemer. des Cur. de la Nat.* Dec. 11, an. 4, p. 46.)

2nd. The decoctions of the leaves applied to parts affected with the itch, produced violent vomitings and convulsions. (Vandumond, *Recueil Periodique*, tom. vii. p. 67.) We read in the *Ephemerides des Curieux de la Nature*, that a person fell into a state of somnolency, and died apoplectic, in consequence of having taken by the nose too great a quantity of snuff.

3rd. The celebrated Santeuil experienced vomitings and horrible pains, amidst which he expired, in consequence of having drunk a glass of wine, into which had been put some Spanish snuff.

916. The facts we have just related induce us to believe:

1st. That the leaves of Tobacco, whether whole, or reduced to powder, as they are daily employed in commerce, are endued with energetic poisonous properties:

2nd. That their active part appears to reside in the portion which is soluble in water, and that it is absorbed, and carried into the circulation.

3rd. That their deleterious effects appear to depend on an especial action upon the nervous system ; and that they produce almost constantly, a general trembling, which is rarely observed when other poisons are employed.

4th. That their action is much more energetic when the soluble portion is injected into the anus, than when it is applied to the cellular texture, and for a still stronger reason, than when introduced into the stomach.

5th. That, independent of the phenomena which we have just been speaking of, they exert a local action capable of producing an inflammation more or less violent.

6th. That they appear to act on the human species as on dogs.

7th. That the *empyreumatic oil* does not act directly on the brain, nor on the body of the nerves, but that it directs its action to the nervous system in a manner which it is not at present easy to determine.

8th. That the extract of the *Nicotiana Rustica* acts in the same manner as Tobacco, but that it is less active.

M. Brodie had been tempted to admit that the infusion of Tobacco, when injected into the rectum, acted primarily on the heart: however, the following experiment caused him to renounce that opinion.

After having taken off the head of a dog, he kept up the respiration by sufflation, and introduced into the stomach and the intestines, nine ounces of infusion of Tobacco. At the moment of the injection the body of the animal remained motionless upon the table, and the heart was beating regularly one hundred times in a minute. Ten minutes after, the pulse gave one hundred and forty pulsations, the peristaltic motion of the intestines was increased, and the voluntary muscles of every part of the body presented very strong spasmodic move-

ments; the articulations of the extremities were alternately bent and extended; the muscles of the spine, of the abdomen, and of the tail, were at one time relaxed, at another time contracted, in such a manner, that the body turned first to one side, then to the other. The abdominal aorta was compressed during more than a minute, so that the circulation was stopped in the inferior limbs, which did not occasion any diminution in the muscular contractions. Half an hour after the injection of the infusion, the sufflation was discontinued; the heart continued to transmit blood of a dark colour, and the muscular contractions diminished in violence and frequency. A ligature was made on the vessels which are at the base of the heart, in order to suspend the circulation; nevertheless, the muscular contractions continued, although less strong, and less frequent than before; at length, after a few minutes, they ceased altogether.

If the contractions of the voluntary muscles, says *M. Brodie,* depended on the action of the blood mixed with the infusion of Tobacco, it is reasonable to suppose that they ought to have been diminished by the compression of the aorta, and that the ligature of it ought to have put a stop to them.

M. Brodie is of opinion, in consequence of this, that the infusion of Tobacco acts upon the heart by means of the nervous system.

OF PURPLE FOXGLOVE.

917. The purple Foxglove *(Digitalis Purpurea L.)* is a plant of the family of the *Personées* of *Tournefort,* and which Jussieu has classed amongst the *Scrophulariæ.*

Description. Calyx permanent, deeply cut into five segments, sometimes unequal; the leaflets arising from the calyx are oval, acute; corolla monopetalous, consisting of a tube swelling out, open, collected together at its base; border short, bearing four *divisions obtuse,* unequal; the superior

one frequently scolloped; the inside of the belly scattered over with red spots, like eyes, and with thin silky hairs; four stamina, two of which are short; style simple, or bifurcated; one capsule, egg-shaped, separated into two cells by a double partition, containing in each cell numerous seeds, small, angular, attached to a pyramidal placenta: stalk from two to three feet high, rising sometimes even to six; straight, or slightly inclined, commonly simple, hairy, furnished with purple flowers, which hang like bells on one side only, disposed in a long terminal spike, and to which succeed capsules egg-shaped, pointed, with rays, containing an infinity of small seeds; this stalk is grooved, cylindrical, and of a reddish green colour: leaves, alternate, petiolated, or drawn up at their base, oval, pointed, dentated like a saw, or rather festooned, wrinkled, of a deep green on the upper side, whitish and lanuginous below, very similar to those of petty mullein, but less woolly; root brownish, fusiform, throwing out here and there numerous branches.

The purple Foxglove is a biennial plant, which is found in the mountains, along hedges, in elevated woods, and in dry and sandy grounds: on which account the environs of Paris are abundantly furnished with it. *Bodard* says, that it appears to have a particular regard for the *Departement de la Mayenne.*

ANALYSIS OF PURPLE FOXGLOVE.

918. Six drachms of the powder of the leaves of purple Foxglove well dried, furnished to *M. Bidault de Villiers;* 1st. Two drachms, sixty grains, of watery extract; 2nd. Twelve grains of spirituous extract; 3rd. A peculiar precipitate, eight grains, and two drachms sixty grains, of an inert powder, which gave by the action of the re-agents, six grains of carbonate of lime, two grains of the oxyde of iron, three grains of sandy quartz, two grains of phosphate

of lime, one grain of sulphate of potash, traces of sulphate and muriate of lime and of carbonated alkali, one grain of charcoal.*

ACTION OF PURPLE FOXGLOVE ON THE ANIMAL ECONOMY.

919. The deleterious properties of Foxglove, and of most of its preparations, are placed beyond all doubt, by experiments made upon animals, and by numerous medical observations. We see in the dissertation of Schiemann, *(de Digitali Purpurea,* Gottingæ, 1786,) that dogs have died in consequence of having taken the extract or infusion of the leaves of Foxglove. Anxiety, melancholy, smallness and slowness of pulse, involuntary stools, and convulsions; such are the principal symptoms which these animals exhibited before death.

920. On what organ does the Foxglove exert its destructive action?

Experiment 1st. A strong dog was made to swallow a drachm and half of the powder of Foxglove. The next day, the animal had not experienced any remarkable phenomenon.

Experiment 2nd. At eleven o'clock, six drachms of the same powder were introduced into the stomach of a strong dog of middle size: the œsophagus was tied. At the end of two hours, the animal made efforts to vomit, his mouth was full of foam. At three, he experienced vertigoes, uttered plaintive cries, lay down upon the side, stretched out his paws, and reflected his head a little backward. At six, he was still able to walk, but staggered like a person drunk with wine; the pulsations of the heart were as before the operation. These symptoms increased in violence; the animal uttered complaints, and expired in the night. The stomach contained almost the whole of the powder ingested; the

* *Essai sur les Propriétés Médicinales de la Digitale Pourprée,* par le Docteur Bidault de Villiers, 3° edit. p. 61. *Paris,* 1812.

mucous membrane was scattered over throughout almost the whole of its extent, with spots of a bright red colour, evidently inflammatory; the rectum presented an alteration similar, but in a less degree.

Experiment 3rd. At one o'clock, an incision was made on the inside of the thigh of a small dog; the wound was sprinkled over with three drachms of the powder of Foxglove, and the lips were united by suture. At two, the animal had not experienced any thing. At four, he had vomited, and his mouth was full of foam. At half past nine in the evening, he experienced considerable vertigoes, and died an hour afterwards. The *dissection*, which took place the next day, did not exhibit any remarkable lesion.

Experiment 4th. At half past ten in the evening, two drachms of the watery extract of Foxglove were introduced into the stomach of a robust dog fasting, and the œsophagus was tied. The next day, at six in the morning, the animal appeared dejected; his walk was free; he experienced no vertigoes; the heart beat from one hundred and twenty, to one hundred and twenty-five pulsations in a minute; the pulsations were strong, equal, and by no means intermitting. At ten, the dejection was increased, the pulsations of the heart continued to be equally frequent. At one, slight vertigoes, difficulty of remaining a long time on his feet; evidently sinking; the state of the circulation the same. He was found dead two hours after. The opening of the body took place while the organs were still warm; the heart was no longer beating; it contained blood which was fluid, and of a deep red colour; the lungs were crepitating, and of a reddish colour; they contained a small quantity of blood; the stomach contained a tolerably large quantity of a brownish, viscous fluid; the mucous membrane was of a bright red throughout its whole extent, but principally near the duodenum; the interior of the rectum presented a few red spots.

Experiment 5th. At one o'clock, two drachms of the

watery extract of purple Foxglove, dissolved in three drachms of water, were introduced into the stomach of a robust dog; the œsophagus was tied. At the end of twenty minutes the animal made some efforts to vomit, and had some tolerably copious stools; the pulsations of the heart, far from being slower than before the ingestion of the poisonous substance, were somewhat more frequent, and by no means intermitting. At half past two, he had fresh stools, coloured brown by the extract. Sixteen minutes after, he had a fresh stool, which was liquid; violent efforts to vomit; pulsations of the heart regular, and as frequent as before. At three, fresh efforts to vomit; a liquid stool: the movements free. At eight, there was no change in the contractions of the heart; the walk of the animal was steady; he had several times a disposition to vomit. At two in the morning, he uttered some plaintive cries, and it is supposed soon after died.

Dissection. The stomach was distended by gas; it contained a small quantity of a greenish liquid matter; there was no lesion of the digestive canal; the lungs were almost in their natural state; the ventricles of the brain contained no serosity; the external vessels of this organ were not distended.

Experiment 6th. At eleven o'clock a wound was made in the back of a small dog, and a drachm of the same extract was brought in contact with the cellular texture; the lips were united by a few points of suture. Three quarters of an hour after, the animal vomited. At forty minutes after twelve, he did not appear to be ill; the pulsations of the heart were somewhat more accelerated than before the application of the poison; they were unequal and intermitting. At ten minutes after one, they were less strong, and almost imperceptible. A quarter of an hour after, the animal supported himself well upon all his four legs, walked about freely, and it would have been impossible to have foreseen the attack which followed immediately: all at once he experienced considerable vertigoes, uttered plaintive cries, walked with rapidity in a lateral

direction and from right to left: he fell down when he arrived near the wall of the laboratory, agitated his paws in a convulsive manner, reflected his head upon the back, and continued to complain in that state for the space of two minutes; a state of relaxation and insensibility then came on, which continued four minutes, after which the animal expired. Death was preceded by a general trembling of all the muscles.

Dissection. He was immediately opened. The heart was no longer beating; the blood contained in the ventricles was *fluid*, and of a somewhat deep red in the aortic cavity; the lungs, which were not very dense, were crepitating and of a rose colour: there was no alteration in the digestive canal.

Experiment 7th. The same experiment was repeated with two drachms of the watery extract of Foxglove, dissolved in two drachms of water; the animal had experienced nothing at the end of an hour and a quarter. He expired four hours after the operation, and presented the same symptoms as those which formed the subject of the preceding experiments. The dissection took place forty minutes after. The heart still preserved a considerable degree of heat, it was no longer beating, and contained a tolerably large quantity of *fluid* blood; there was no alteration in the digestive canal.

Several other animals of the same species were submitted to experiments of this kind, and we have constantly observed the symptoms and the phenomena on dissection, as we have reported in the two preceding experiments.

Experiment 8th. A drachm of the watery extract of purple Foxglove, dissolved in half an ounce of water, was injected into the jugular vein of a very strong dog. Two minutes after, the pulsations of the heart were diminished by ten strokes in the minute. At the end of two minutes more, the animal began to make violent efforts to vomit, and continued them during three minutes. Seven minutes after the injection, he looked astonished, preserved the free use of his senses, experienced slight vertigoes, walked about with his head hanging

down; the pulsations were more accelerated than before the operation. One minute after, he fell down upon the side, beginning first to sink behind; the head was reflected on the back; the extremities were agitated with some convulsive movements, and the organs of sense became insensible. To this state, which continued two minutes, succeeded a considerable diminution in the violence of the symptoms, and there remained only a general trembling of the muscles of the trunk. He expired at the end of three minutes. He was immediately opened. The heart contained only fluid blood, of a red vermillion colour in the left ventricle, and blackish in the right: the lungs were sound.

Experiment 9th. Half a drachm of the same extract, dissolved in half an ounce of water, was injected into the jugular vein of a small dog. The next day the animal had not experienced any thing remarkable; he refused, however, to receive food. Five days after the operation, he was walking about very well; had no vertigoes, but refused to take any food. He died in the night of the following day. There was no sensible lesion in the brain; the cerebral vessels contained hardly any blood; the lobes of the right lung, which were of a violet colour, and of a dense texture, as though hepatized, were distended with black blood; the left lung presented here and there some spots similar, as to their colour and their texture, to those which we have remarked on the right part of this organ; the stomach was lined with yellow bile; the membranes of the digestive canal presented no alteration.

Experiment 10th. At twenty minutes past two, two drachms of resinous extract, prepared by treating the powder of purple Foxglove with alcohol, were introduced into the stomach of a small dog, and the œsophagus was tied. At thirty-eight minutes after two, the animal experienced some nausea, and made some efforts to vomit; the pulsations of the heart, which were irregular and unequal, were more slow and more intermitting than before the operation. Six minutes after, he con-

tinued to make efforts to vomit; the heart beat only fifty-four strokes per minute, whilst before the ingestion of the poisonous substance, it was beating ninety. At twenty minutes after three, fresh efforts to vomit; no change in the pulsations of the heart. At five, the animal was walking about freely: there was no acceleration in the pulse; the desire to vomit still continued. It was reported to me that he died at half past seven the same day. The dissection, which took place the next day, discovered nothing in the lungs, nor in the digestive canal.

Experiment 11th. At forty minutes past ten, the same experiment was begun on a small robust dog, his heart beat from ninety to ninety-four pulsations in the minute. At half past one, the circulation was evidently deranged; the pulsations of the heart, which were as frequent as before the operation, were unequal, sometimes strong, sometimes weak, and they presented very distinct intermissions. At a quarter past two, the animal was lying down on his side, and preserved the use of his senses; however, he experienced slight vertigoes, and could not walk without staggering; his breathing was not interrupted; there was no change in the pulsations of the heart. At a quarter past three, he was placed upon his feet; he immediately bent the posterior limbs, bowed down the head almost to the ground; he shortly after righted himself; and tried to walk forward in a straight line. He had scarcely made two steps, when he bent the anterior extremities, and fell down upon his belly. These alternate movements of the hind feet, the fore feet, and the head, were renewed three times successively. At last, at seventeen minutes after three, the animal expired in a state of great insensibility and immobility. He was immediately opened. The limbs presented no stiffness; the pupils were excessively dilated; the heart was no longer beating; the blood contained in the left ventricle was of a bright red colour, and fluid; the right ventricle was nearly empty; the great vessels of the thorax, being wounded

in opening this cavity, allowed an effusion of blood to take place, and there was found, on the right of the dorsal vertebræ, a large *coagulum*, of a blackish colour and very hot; the lungs were crepitating, and contained a small quantity of blood.

Experiment 12th. A wound was made on the back of a small dog; two drachms of the resinous extract of Foxglove were brought in contact with the cellular texture; and the lips of the wound were united by suture. At the end of twenty minutes the animal vomited some alimentary matter, and several times during the five minutes which followed made efforts to vomit; there was no change in the pulsations of the heart. Forty-three minutes after the application of the poison, the pupils were excessively dilated, and he staggered a little in walking; he had a very copious liquid stool. Four minutes after, the vertigoes were so much increased that he bent his hind legs, fell down suddenly on the side, uttered a few slight cries, and appeared dead. In this state he passed a small quantity of urine; a general trembling appeared of the muscles of the abdomen, and *subsultus tendinum* of the right anterior extremity; the organs of sense no longer exercised their functions. He expired ten minutes after. The dissection took place immediately. The heart was no longer beating; the blood contained in the left ventricle was fluid and of a bright red colour; that of the right ventricle was all *coagulated* and black; the lungs, which were of a rose colour, appeared to be in their natural state; the digestive canal presented no alteration.

Experiment 13th. At half past two, the same experiment was repeated upon a dog of middle size. At twenty minutes past three, vomiting of alimentary matter; no relaxation in the circulation. Two minutes after, fresh vomitings, followed by fruitless and frequently repeated efforts. At half past three, a diminution of fifteen pulsations per minute, in the motion of the heart, inequality, distinct intermission. Ten

minutes after, acceleration in the circulation; pulsations of the heart more frequent than before the application of the poison; respiration somewhat impeded. Three quarters of an hour after, falling and other symptoms similar to those of the preceding experiment. Death took place at twenty-seven minutes after four.

The Dissection took place immediately: the heart no longer contracting; the blood contained in the right ventricle wholly coagulated.

Experiment 14th. At eleven o'clock, a drachm of the same extract was brought in contact with the cellular texture of the back of a small robust dog, and the lips of the wound were united by suture. At a quarter past twelve he vomited, and died at half past twelve, without our being able to observe him. He was opened ten minutes after. There was no longer any motion in the heart; the blood contained in the right ventricle was partly fluid, and presented some *coagula* tolerably large and blackish; that of the left ventricle was fluid, and of a red somewhat less bright than common; the lungs were rose-coloured, and but little crepitating.

Experiment 15th. Eighteen grains of resinous extract of Foxglove, suspended in half an ounce of water, were injected into the jugular vein of a small dog. The animal instantly experienced vertigoes; he made a few steps, fell down, rose again, and continued to walk staggering. One minute after the injection, the pulsations of the heart were somewhat relaxed; but a few moments after, they became as frequent as before the operation. At the end of five minutes, they preserved their frequency, and his walk was more vacillating. Two minutes after, the pulsations were no longer felt; the animal fell down upon his side; his head was reversed upon the back, and he experienced convulsive movements in the paws. This state continued four minutes, after which the animal uttered some plaintive cries; all his muscles were trembling, and he expired. He was opened the same mo-

ment. The heart was no longer beating, the blood of both ventricles was *fluid;* that contained in the aortic cavity was red; the lungs, which were crepitating, were wrinkled, and contained scarcely any blood; the tongue and gums were pale.

Experiment 16th. Ten grains of the same extract, suspended in three drachms and a half of water, were injected into the jugular vein of a small dog. Four minutes after, the animal vomited, passed a liquid stool, experienced vertigoes, which became stronger and stronger, to such a degree, that two minutes after he fell down on the side, uttered a few plaintive cries, separating his legs, and agitating them in a convulsive manner; his mouth discharged moisture, and his head was reflected on his back. He expired eight minutes after the injection. No change was observed in the pulsations of the heart. The body was immediately opened; the heart was no longer contracting; the blood was *fluid,* and of a deepish red colour in the left ventricle; the lungs presented no sensible alteration.

Experiment 17th. At half past eight, an ounce of tincture of purple Foxglove, prepared with brandy at 24°, and of the powder of this plant, were introduced into the stomach of a small dog: the œsophagus was then tied. At the end of five minutes, the animal was in a state of remarkable stupor; he had vertigoes, and could not make two steps without falling; the pulsations of the heart were by no means relaxed. At nine he remained lying upon the side; he complained from time to time; the stupor had increased; the pulsations of the heart were frequent, unequal, irregular; his inspirations were rare, but excessively deep; the eyes but little sensible to light, the pupils somewhat dilated; and he had no propensity to vomit. At half past one, convulsive tremblings of the muscles of the extremities; same state of stupor; impossibility of standing; complaints from time to time; pulsations of the heart frequent. At ten in the evening, in the same state. He died

the next morning at four o'clock. The mucous membrane of the stomach presented several patches of a deep red colour; near the pylorus were perceived some longitudinal bands of a blackish red, the colour of which depended on a certain quantity of blood extravasated between this membrane and the subjacent coat; this latter presented no alteration; the duodenum exhibited a lesion similar to that of the stomach; there was found near the end of the colon, in the space of four fingers' breadth, on its internal surface, a very intense redness, which extended itself to the subjacent muscular coat; the rest of the intestinal canal appeared very little altered.

Experiment 18th. Six ounces of brandy, at 24°, were poured upon ten drachms of the powder of purple Foxglove. After four days' digestion, the fluid was filtered and evaporated, adding water in proportion as the alcohol was reduced to vapour. At ten o'clock, four ounces of the fluid resulting from this process were introduced into the stomach of a small dog, being completely freed from all the spirit: the œsophagus was then tied. Twelve minutes after, the animal made efforts to vomit; his walk began to be vacillating; the pulsations of the heart were the same as before the operation; the eyelids heavy, like those of a person that is sleepy. At three, the stupefaction was carried a little farther. He died in the night. The mucous membrane of the stomach presented, in the two thirds of it next the pylorus, some small spots of a tolerably bright red colour, separated by intervals that were unaltered; the lungs and intestinal canal presented no sensible lesion.*

M. Brodie, during my stay in London, was so good as to communicate to me the following fact, which has the greatest connection with those which we have just been stating. He injected into the stomach of a small dog, half an ounce of the

* It is evident that the greatest part of the symptoms and lesions mentioned in the 17th experiment, were the consequence of the brandy in which the Foxglove was dissolved. (*Vide* article *Alcohol.*)

tincture of Foxglove, the alcohol of which had been previously evaporated, as has been pointed out in the preceding experiment. Half an hour after, seeing that this dose was without effect, he introduced two drachms more of the same liquor. At the end of ten minutes, the pulse was fallen from one hundred and fifty, to one hundred and twenty pulsations in the minute, and the animal experienced a trembling similar to that observed in a paroxysm of intermitting fever. This shivering lasted twenty minutes, after which the pulse again gave one hundred and fifty pulsations a minute. Shortly after, he vomited greatly, and passed several stools, which were repeated several times during the first two hours, which followed the ingestion of the poison. The next day, the animal was perfectly recovered.

Observations.

1st. *M. Bidault di Villers* says, " I chewed a large pinch of the powder of the leaves of Foxglove, which I had dried myself with care, and kept for some time. It had at first a nauseous and herbaceous taste; afterwards I found it extremely bitter, and it caused me to render a tolerably large quantity of saliva, which secretion continued some time after I had spit out the powder, which I had triturated without any mixture in my mouth. It was not until the bitterness was totally dissipated, that I thought I perceived a slight sensation of acrimony in the throat. It caused me also a kind of inclination to vomit, or rather a weak heaving of the stomach, and dryness in the mouth. (Op. citat. p. 45.)

2nd. A feeble person labouring under anasarca and hydrothorax, swallowed by mistake four or five times as much Foxglove as was prescribed for him. He experienced nauseas, which increased so strong the next morning, that he threw up a little bile every five or ten minutes, after having made the most violent efforts to vomit. Dr. Beddoes, the reporter of this fact, being frightened, from having seen a very robust man

die in consequence of having taken the same infusion, administered three grains of opium, in two doses, at the interval of an hour one from the other; after which he ordered fifteen drops of thebaic tincture to be taken every hour in port wine, until he should sleep. The next morning, the vomitings were less frequent; they only returned once in half an hour, and sometimes an hour; the patient slept between each attack, and always awoke again with nausea. Sixty drops of tincture of opium were prescribed in a glyster, and twenty-four grains of powder of ipecacuanha, to be taken in three doses, in the form of pills; and lastly, extract of hemlock in the interval of the two hours between each dose. In the evening, another glyster was given. He perspired abundantly during the night, and woke still with nauseas; the vomitings, though less frequent, were sometimes accompanied with hiccup. The following day, he vomited no more bile, and appeared to be under the influence of the opium. The day after, he drank some toast and water without inconvenience, and experienced no uneasiness; the appetite returned, and he drank nearly half a bottle of wine in the day. Bark in substance was administered to him for eight days, combined with aromatics; the swelling of the feet, which had taken place for some days, especially towards night, had disappeared, and the patient was perfectly restored.*

3rd. *M. Sanders,* author of an excellent treatise on Foxglove, says, " In health every small dose of Foxglove increases the strength and frequency of the pulse, produces even inflammatory fever if it be increased, or if the use of it be continued. In a state of disease, the primitive effects are just the same, but there is observed beside, its influence on the affection, on the state contrary to nature; it vivifies, if I may so express it, ulcerated surfaces which are bleeding, or pale;

* Th. Beddoes, *Medical Facts and Observations,* vol. v.

facilitates the absorption of effused fluids, or prevents their effusion; fortifies the voluntary motions; gives activity to digestion; increases the evacuations by the skin and urinary organs; renders the pulse insensibly febrile; raises it from seventy to ninety pulsations in a short time, even from one hundred and twenty, to one hundred and thirty, or from one hundred and thirty, to one hundred and fifty, if the physician does not know when to stop; in fine, Foxglove gives to the moral principle the peculiar character which belongs to restoration of force. These are its good effects; but abuse and imprudence in the use of it, bring on derangement of the functions of the stomach, vertigoes, vomitings, want of sleep, violent pulsations of the vessels of the head, pains in different parts of the body, &c. Although the Foxglove be given up, the febrile symptoms continue nevertheless for four or five days with the same degree of intensity. In general however, at the end of four and twenty hours, and often sooner, the pulse falls from one hundred and twenty, to one hundred and ten, and one hundred irregular pulsations. As to their force and frequency, they are still more reduced; there exist low spirits, nausea, oppression of the præcordia, vomitings, which afford no relief to the patient, salivation, diarrhæa, abundant secretion of limpid urine, clammy moisture of the skin, even profuse sweats; countenance pale, expressive of despair. Two, three, or four hours more, and the violent symptoms diminish; the pulse far from rising immediately after the calm, sinks on the contrary to fifty, forty, thirty pulsations, and even lower. This increase of strength of the sanguineous system, and the consecutive diminution, vary according to the quantity of the medicine, the susceptibility of the person, the temperament more or less disposed to inflammatory fever; according as the patient is at the moment affected with a local inflammation, as sound or ulcerated parts are tending to a laudable suppuration: in that case the action of the Foxglove, and

that of the disease, are complicated; and possess greater violence.*

921. We may be permitted to conclude from the preceding facts:

1st. That the powder of Foxglove, its watery and resinous extracts, and its tincture, ought to be regarded as energetic poisons, in a certain dose.

2nd. That the resinous extract is endued with poisonous properties more active than the watery extract, and that the powder is less powerful than this latter.

3rd. That the action of the extracts is violent and rapid when injected into the jugular vein; that it is less so when applied to the cellular texture; and much less still when they are introduced into the stomach, and vomiting is prevented.

4th. That all these preparations begin by acting as emetics.

5th. That their effects on the organs of circulation vary according to the nature and dispositions of the individuals; sometimes no change can be observed in the manner in which this function is carried on; at other times the pulsations of the heart are relaxed; very frequently they are accelerated, strong, unequal, and intermitting.

6th. That the resinous extract appears to act especially on the heart or on the blood, since this fluid is constantly found coagulated immediately after death, whenever this extract has been applied to the cellular texture, or introduced into the stomach.

7th. That independently of these phenomena, Foxglove and its preparations act upon the brain after having been absorbed, and produce a sort of instantaneous stupefaction, which is quickly followed by death.

8th. That the powder of this vegetable occasions a local

* *An Inquiry concerning Digitalis, or Foxglove, Edinburgh*, 1808, p. 61. The facts contained in this little work are so much the more valuable as they have been collected from observations on the human species.

irritation capable of exciting an inflammation sufficiently intense.

9th. That all the observations conspire to prove that Foxglove acts upon the human species as upon dogs.*

OF MEADOW PIMPERNEL (*ANAGALLIS ARVENSIS*).

Experiment 1st. At eight in the morning, three drachms of the extract of Pimpernel, prepared by evaporating in a water-bath the juice of the fresh plant, and dissolving it in an ounce and a half of water, were introduced into the stomach of a robust dog of middle size. At half past twelve, the animal had a stool. At six in the evening, he was dejected. At eleven sensibility appeared diminished. The next morning at six, he was lying upon the side, and appeared to be dead; he might be displaced like an inert mass of matter. He expired half an hour after. The mucous membrane of the stomach was slightly inflamed; the interior of the rectum was of a bright red colour; the ventricles of the heart were distended by black coagulated blood; the lungs presented several livid spots, their texture was more dense than in their natural state.

Experiment 2nd. At eight in the morning, two drachms

* We foresee an objection which may be made to us by some practitioners; viz. *that Foxglove retards the motions of the heart in the human species.* We cannot admit this assertion in its full extent. In fact, 1st, we have taken every day, during a month, from four to twenty grains of this vegetable reduced to powder; we have never observed the smallest diminution in the pulsations of the heart; which circumstance agrees perfectly with an infinite number of observations reported by *M. Sanders.* 2nd. How many times has not the administration of this powder, or of its tincture, in hospitals been seeu to increase fever, to produce a great heat in the chest, and spitting of blood. Wherefore we are of opinion, that this vegetable is very far from being entitled to be ranked amongst those which constantly diminish the motions of the heart, and this object appears to us of sufficient importance to fix anew the attention of practitioners.

of the same extract, mixed with an equal quantity of water, were applied to the cellular texture of the thigh of a small robust dog. The animal exhibited the same symptoms as that which forms the subject of the preceding experiment, and died at half past seven in the evening. The digestive canal was sound; the limb operated on presented a slight inflammation; the lungs and the heart were the same as in the preceding experiment.

M. Gronier gave to horses some tolerably strong doses of the decoction of this plant, and he observed almost constantly a trembling of the muscles of the posterior extremities, as well as those of the throat, and a copious flow of urine. After death, the mucous membrane of the stomach was found inflamed.*

OF COMMON BIRTHWORT (*ARISTOLOCHIA CLEMATITIS*).

922. This plant, ranked by Linnæus in the Gynandria Hexandria, belongs to the family of the *Aristolochiæ* of Jussieu.

Perigone (calyx) tubular, irregular, bellied at its base, enlarged at its orifice, and having its border prolonged and ligulated on one side: germen inferior, oval, oblong, angular, surmounted with a style very short, terminated by a concave stigma of six divisions, under which appear six anthera almost sessile, making one body with the pistil. The fruit is an oval capsule, of six angles, having six cells, opening by the base, and containing a great number of flat seeds: flowers of a pale yellow, pedunculated, and collected from three to five together in the axillæ of the leaves: stalk from four to six feet in height, tolerably strong, simple, covered with leaves, and angular: leaves alternate, petiolated, heart-shaped, smooth, pre-

* *Compte rendu des travaux de la Société de Médicine de Lyon*, ann. 1810, p. 17.

senting on their inferior surface a number of ribs ramified, and reticulated. This plant has an acrid and bitter taste: it grows on the banks of rivers, in clayey places, and among ruins.

ACTION OF COMMON BIRTHWORT UPON THE ANIMAL ECONOMY.

Experiment 1st. At seven in the morning, five drachms of fresh root of Birthwort powdered, were introduced into the stomach of a small robust dog; and the œsophagus was tied. The next evening, the animal had only experienced a slight dejection. The following day, at six in the morning, he had vertigoes, and could not walk without falling after making a few steps; he strained to vomit, and passed one solid stool; a quarter of an hour after, he was lying down on the side, but very little sensible to external impressions; his feet were stretched out, separated from one another, stiff, and were at intervals in a state of agitation. The head was reflected a little upon the back. At half past ten, the symptoms continued; the breathing was deep. He died at one o'clock. No alteration was discovered on dissection, except in the rectum, which presented some red spots.

Experiment 2nd. At eight in the morning, the same experiment was begun again on another dog about the same size; no particular phenomenon was observed in the course of the day. The next morning at seven, the animal presented from time to time, some slight convulsive movements in the ears; his posterior extremities were extremely weak; he had great difficulty in keeping himself for a moment on his feet; the head appeared heavy; the inspirations were deep. He died three hours after. The stomach contained a great part of the powder ingested; its coats were not altered; there were seen here and there in the large intestines, some livid spots; the lungs were of a beautiful rose colour; and were less crepitating than in their natural state.

Experiment 3rd. Seven ounces of the root of common Birthwort cut in pieces, were boiled with ten ounces of water. The fluid was reduced to seven ounces; it was then introduced into the stomach of a robust dog of small size, and the œsophagus was tied. An hour after, the animal made some efforts to vomit, which were frequently renewed during the four hours succeeding; he uttered plaintive cries, and fell into a state of dejection. The next morning at seven, (four and twenty hours after the operation,) the dejection was increased, the animal was lying down on his belly; nevertheless, he preserved the free use of his senses and motions: the following day, at eight in the morning, he was found dead. The dissection took place immediately. The body was still warm; the blood contained in the heart was brownish, and partly coagulated; the stomach and the rectum were somewhat inflamed; the other organs appeared sound.

The juice of the root of *Aristolochia Anguicida,* administered to serpents in the dose of a few drops, produces vertigoes, and causes them to die in convulsions. (MURRAY, *Apparatus Medicaminum,* tom. i. p. 516. Gottingæ, ann. 1793.)

923. It results from these facts:

1st. That the common Birthwort exerts a stupifying action on the nervous system.

2nd. That it produces a slight inflammation in the texture to which it is applied.

OF HEMLOCK (*CONIUM MACULATUM,* L. OR *CICUTA MAJOR* OF *LAMK*).

924. This plant belongs to the family of the *Umbelliferæ* of Jussieu, and to the Pentandria Digynia of Linnæus.

Characters. Flowers white, forming umbels very open and numerous: general involucrum, from three to five leaflets reflected, and membranous towards their base; *involucellum* of three leaflets disposed on the external side of the umbel,

and not extending beyond its rays. Each flower presents five petals heart-shaped, unequal, disposed in form of a rose, and inclining inwards : a small calyx, entire ; five stamina ; one inferior germen bearing two slender styles longer than the petals, and permanent; fruit oval, and globular; each side has projections, consisting of tubercular elevations, of which three are dorsal, and two lateral. Stalk cylindrical, from three to five feet in height, thick, hollow, branchy, covered with leaves, and in its inferior parts, with spots of a brown purple, or blackish : leaves large, somewhat soft, thrice-winged ; the leaflets of which are lanceolated, dentated, pointed, somewhat shining, of a blackish green colour : root fusiform, a foot long, thick as the finger, yellowish without, whitish within, strong smell, and of a sweetish taste. This plant, when rubbed between the fingers, exhales a fetid smell ; it is found on the sides of ditches, and in rather moist grounds.

ACTION OF HEMLOCK ON THE ANIMAL ECONOMY.

Experiment 1st. A small dog was made to swallow a drachm and half of the powder of Hemlock. Four hours after, the animal passed one stool. The next day he was in excellent health.

Experiment 2nd. Half an ounce of the same powder was introduced in the stomach of a small dog, and the œsophagus was tied. The animal died at the beginning of the sixth day, without having experienced any remarkable symptoms. On opening the body, the organs were found without any discernible alteration : no doubt this animal died in consequence of the operation. This experiment was repeated at noon, on a dog of middle size, with one ounce of the same powder. Seven hours after, the animal did not appear indisposed. The next day at noon he was walking about freely, and uttered no complaint. He did not appear more ill the

following day at one o'clock. The next day he was able to walk about freely, but began to complain, and kept himself generally lying down on the side: the pupils were not more dilated, than in their natural state; the inspirations were deep and rare: he saw and heard very well. He died in the night. He was opened the next day, at seven in the morning: the blood contained in the heart was still fluid; the lungs were sound; the stomach contained almost the whole of the powder ingested; no vestige of inflammation was perceived in the digestive canal, except in the interior of the rectum, which presented a few reddish spots.

Experiment 3rd. On the 22nd of April, at one o'clock, a small dog was made to swallow an ounce and half of the fresh root of *Conium maculatum:* the œsophagus was tied. Forty-eight hours after, he had experienced nothing. The next day, the 23rd, an ounce of the same root bruised, and eight ounces of juice proceeding from three pounds of the root well pounded, with two ounces of water, were introduced into the stomach of a dog: the œsophagus was tied. Twenty-four hours after, the animal had not presented any remarkable symptom: the 25th of April, at noon, these two animals were only somewhat dejected.

Experiment 4th. The same day, about four pounds of the leaves and stalks of fresh Hemlock were triturated, and fourteen ounces of juice, which they furnished, were given to a small robust dog: the œsophagus was then tied. A quarter of an hour after, the animal made efforts to vomit; he experienced vertigoes, and a slight trembling of the posterior extremities. Three hours after, he was found dead. He was opened the next day. Almost all the juice was still in the stomach; the mucous membrane of this viscus was of a bright red throughout its whole extent; the other parts of the digestive canal appeared sound; the lungs were distended with blood, still fluid; they presented here and there livid patches,

dense, and but little crepitating; the blood contained in the ventricles of the heart was partly fluid, and partly coagulated.

Experiment 5th. On the 31st of May, at seven in the morning, about eight ounces of the juice proceeding from two pounds of the leaves of Hemlock, were introduced into the stomach of a young dog of middle size, and the œsophagus was tied. Ten minutes after, the animal made efforts to vomit. At ten, he uttered some plaintive cries; the muscles of the extremities presented from time to time some slight contractions; he walked with tolerable freedom. At half past twelve, he was found dead. He was immediately opened. His body was still warm: the blood contained in the right ventricle of the heart was black, and completely coagulated; that of the other ventricles was fluid, and of a deep red colour: the lungs were the same as in the preceding experiment; the stomach contained almost the whole of the juice ingested; its coats did not appear altered; the interior of the rectum, which was covered with a portion of the juice, presented several reddish spots.

Experiment 6th. A small dog was made to swallow two drachms of the watery extract of Hemlock, bought of an apothecary. The next day, the animal was in excellent health, and had experienced nothing.

Experiment 7th. The same experiment was repeated at seven in the morning, on a small weak dog, with an ounce of the same extract dissolved in three ounces of water: the œsophagus was then tied. Ten minutes after, the animal made efforts to vomit, which were repeated five times in the twelve following minutes. At eight, he passed one solid stool; for the rest he experienced nothing during the day. The next day, at ten in the morning, he was sinking a little; nevertheless he preserved the faculty of hearing and walking. He died at five in the evening, that is to say, *thirty-four hours after the ingestion of the extract.* He was opened the same day. The

heart contained black and coagulated blood; the lungs presented several livid spots; the interior of the stomach and rectum was slightly inflamed.

Experiment 8th. In order to be better able to judge of the difference existing between this extract, and that of another apothecary, we shall report the following fact. At eight in the morning, seven drachms and a half of the watery extract of Hemlock, prepared by another apothecary, and dissolved in three ounces of water, were introduced into the stomach of a small and very strong dog: the œsophagus was tied. At the end of five minutes, the animal passed one solid stool. At ten minutes past eight, he made some efforts to vomit, which he repeated twelve minutes afterwards. At twenty-five minutes past eight, he already experienced decided vertigoes; his head was extremely heavy; he had another liquid stool. At half past eight, he fell down on his side, and appeared to be dead; the organs of sense and motion no longer performed their functions; the animal might be displaced like an inert mass of matter, and it was impossible for him to support himself one moment on his feet; from time to time, however, he presented some convulsive motions in the lower jaws; the breathing was carried on in a manner almost insensible. At thirty-six minutes past eight, the movements of the jaws were diminished, and five minutes after, they ceased entirely; the animal died at the same moment, that is to say, *forty-one minutes after the ingestion of the extract.* He was immediately opened. The heart was contracting with some force; the blood contained in the left ventricle was fluid, and of a bright red colour; the lungs presented the rose colour, which is natural to them; there was no alteration in the digestive canal.

Experiment 9th. Forty grains of the extract of Hemlock, bought of the same apothecary who had furnished that used in the sixth experiment, were applied to the cellular texture of the back of a small dog. Seven days after, the animal had

not experienced any remarkable symptom; he had constantly eaten with an appetite.

Experiment 10th. At seven in the morning, an incision was made in the inside of the thigh of a small robust dog; three drachms of the same extract were introduced into the wound, and the lips were united by suture. Two days after, at noon, the animal did not appear to have experienced any inconvenience. He died five days after the operation, and did not exhibit any remarkable symptom. No alteration in the digestive canal; the lungs were livid, exhibiting a multiplicity of spots, which were blackish, and gorged with blood; the wound somewhat inflamed; little or no infiltration in the limb.

Experiment 11th. At a quarter past eight, *two drachms of the watery extract of Hemlock, prepared by evaporating in a water-bath the juice of the fresh plant, and mixed with two drachms of water,* were applied to the cellular texture of the inside of the posterior extremities. The animal quickly began to experience the symptoms related in experiment 8th. At half past nine, he was lying down on the side; the breathing was performed slowly; the muscles of the extremities were agitated by slight convulsive movements; they exhibited a general trembling. The animal died at the end of five minutes more, that is to say, one hour and twenty minutes after the application of the extract to the cellular texture. He was opened the next day. The limb operated on was not much inflamed; the digestive canal did not present any alteration; the blood contained in the ventricles of the heart was partly fluid, partly coagulated; the lungs presented several livid patches; their texture was dense, and but little crepitating.

Experiment 12th. Twenty-eight grains of the watery extract of Hemlock, dissolved in four drachms of water, and similar to that of the 6th, 9th, and 10th experiments, were injected into the jugular vein of a small robust dog. Instantly

the animal experienced considerable vertigoes; he fell down on the side; his extremities were agitated by convulsive movements; the organs of sense became insensible, and the head was reflected on the back. He died at the end of two minutes. He was opened a moment after. The blood contained in the heart was fluid, and of a red colour not very bright in the left ventricle; the lungs were somewhat shrivelled and less crepitating than in their natural state.

Another animal placed under the same circumstances, furnished similar results.*

Experiment 13th. Twelve grains of the same extract, dissolved in two drachms of water, were injected into the jugular vein of a small dog. Four minutes after, the animal appeared a little sleepy; his breathing was accelerated, and he did not attempt to walk. These symptoms disappeared, and the next day the animal was perfectly recovered.

Experiment 14th. Two drachms of the *resinous* extract of Hemlock, prepared with the dry powder, were applied to the cellular texture of the back of a small dog. Six days after, the animal had not experienced any thing, and appeared to be in good health.

Experiment 15th. The same experiment, repeated upon another dog, with this difference, that the wound had been made in the inside of the thigh, presented the same results. Three days after, the animal was in good health, and made his escape.

Experiment 16th. Two drachms of the same extract were applied to the cellular texture of the back of a small dog. Six days after, the animal, who had constantly refused food, died in a state of dejection, without having experienced any vertigoes. On opening the body no lesion could be discovered.

* Thirty-two grains of the same extract, injected into the jugular vein of a *very strong* dog, did not produce any symptoms. Two days after, the same quantity was injected into the vein on the other side; the animal experienced nothing.

Experiment 17th. Twelve grains of the resinous extract of Hemlock, suspended in two drachms and a half of water, were injected into the jugular vein of a small robust dog. Immediately, the animal uttered plaintive cries, he experienced considerable vertigoes, and fell down on the side; the head was strongly reflected upon the back; the legs stretched out, and separated from one another; they were agitated by convulsive movements: these symptoms lasted nearly three minutes: then insensibility of the organs of sense, dilatation of the pupils, general tranquillity, very remarkable coma; trembling of every part of the body. He died six minutes after the injection. The body was immediately opened. The heart was quivering; the blood contained in the left ventricle, was of a vermillion red colour, and partly coagulated; the right ventricle was almost empty, and the lungs were in their natural state.

Observations.

1st. " Being in garrison at Torrequemada in Spain, I was called at seven in the evening, on the 2nd of March, 1812, to visit a grenadier, who was reported to be dying. I found the patient in a profound sleep, without sense, respiring with extreme difficulty, and lying on the ground on a little straw, in a small narrow low room, close shut, and filled with people and with smoke. His pulse small, hard, and slow, even to thirty pulsations in the minute; the extremities were cold; the face bluish, and distended with blood, like that of a person strangled. The patient was placed in the fresh air. I was informed that he had eaten, together with several of his comrades, some broth into which Hemlock had been put; and that since supper, the whole were as if drunk, and felt pains in the head and throat; that this grenadier, who had commonly a good appetite, had eaten a greater quantity of it than the rest, and immediately after having supped, had undressed himself, lain down, and gone to sleep, whilst the others still

remained at table to converse together; that an hour and half after, when they had begun to find themselves indisposed, they had remarked that this man was groaning and breathing with difficulty, which had determined them to have me called. I hesitated for a moment, whether I should begin by making him swallow, in large quantity, some hot vinegar, in order to neutralize, by this antidote, the effects of the narcotic; or by opening the jugular vein, in order to remedy speedily the manifest congestion of blood towards the head; or, in fine, by evacuating the poison by the shortest way: however, I determined on the administration of an emetic. I made him swallow twelve grains of emetic tartar, dissolved in warm water; and caused him to inhale the steam of vinegar. Cold fomentations were applied to the head, and dry and hot frictions to the extremities, in order to recal the circulation, and diminish the cerebral congestion: half an hour after having taken the emetic, the patient began to make some fruitless efforts to vomit, and in a short time his situation, which had given some hope before, grew visibly worse, nevertheless he still spoke, and complained of being very cold; but in a short time he lost again the use of speech and knowledge, and shewed only by continual palpitations of the breast, and of the epigastric region, the extreme anguish with which he was tormented. Then, without waiting longer the effect of the vomit, I ordered him to swallow some hot vinegar, and the frictions to be kept up without intermission, whilst I went to seek a lancet to open the jugular vein; but I arrived too late, for the patient had ceased to live a few moments before my return, three hours after the fatal supper.

" *Dissection.* The stomach was half filled with crude broth; there were round the pylorus some red spots; the liver was very voluminous; there was no alteration in the intestines; the *vena cava* and the heart were emptied of blood; the pectoral cavity was narrow; the left lobe of the lungs was sound, but the right lobe was entirely destroyed by a preced-

ing suppuration. (This man, who was thirty-five years of age, was robust ; he had experienced from time to time a dry cough, and his breathing was painful.) On opening the cranium, there flowed out a sufficient quantity of blood to fill twice an ordinary chamber-pot ; the vessels of the brain were extremely gorged with blood." (Observation of *M. Haaf,* Chirurgien Aide-major. *Journal de Médecine de M. Leroux,* tom. xxiii. p. 107, Fevrier.)

2nd. " A man was attacked by a large cancerous ulcer, which had already destroyed the *Velum Palati,* and produced a caries of part of the vault of the palate. A slight delirium, and some syncopes obliged him in a short time to suspend the use of the extract of *Conium Maculatum,* which was given afterwards with advantage in a more moderate dose. This extract had been prepared at *Puerto-Real* in Andalusia, after the method of Storck. The dose however had been by very insensible degrees carried as far as sixteen Décigrammes *(about half a drachm);* which proves that in the southern countries, some vegetables enjoy more energetic properties than in the north." (CHOQUET, *idem,* Avril, 1813. p. 359.)

3rd. *Agasson* speaks of a man who had taken Hemlock, and who had all the superior parts of the body affected by convulsions, whilst the inferior parts were paralysed. A furious delirium has sometimes been observed in other persons.

4th. An Italian, who cultivated vines in his own country, found amongst them a plant of this kind, which he took for a parsnip ; he ate the root of it for his supper, together with his wife ; they went to bed after this meal. In the middle of the night, they awoke completely mad, and began running here and there without a light over the whole house, in a fit of madness and fury ; they struck themselves so rudely against the wall, that they were bruised all over, and their face particularly, and eyebrows, appeared all swelled and bloody: suitable medicines were administered to them, and they were restored to health. (VICAT, *Op. citat.* p. 274.)

It results from the preceding facts,

1st. That the fresh leaves of Hemlock furnish, at a certain period, a juice which possesses energetic poisonous properties; and that which is obtained from the roots at the same time, possesses little activity.

2nd. That the watery extract prepared *by evaporating in a water-bath, the fresh Hemlock,* preserves the greatest part of the properties of the plant; whilst at the same time it possesses but little activity, and sometimes is even altogether inert, when obtained by boiling the dry powder in water, and evaporating the decoction at an elevated temperature.*

3rd. That these different preparations produce effects more rapid and more decided, when injected into the jugular vein, than when applied to the cellular texture, and for a still stronger reason than when introduced into the stomach.

4th. That they are absorbed, carried into the circulation, and exert an action on the nervous system, and more particularly on the brain.

5th. That independently of this action, they exert a local irritation, capable of producing an inflammation more or less violent.

* There are to be found in commerce, a multitude of extracts of Hemlock, which may be regarded, with respect to their properties, as holding a middle station with those here spoken of: some have little or no medical virtues, others have more; and there are some which are totally inert. We were one day in the shop of an apothecary, who had several times furnished us with the extract of Hemlock, which we have administered to dogs, to the dose of ten drachms, without producing any serious accident. We endeavoured to prove to him that the medicine was badly prepared, and in order to convince him effectually, we swallowed, in the presence of several persons, who happened to be in his shop, a drachm of this extract (seventy-two grains) dissolved in two drachms of water. We felt no effect from it, whilst twenty or thirty grains of the extract well prepared, would have probably proved fatal to us. Let it be conceived now, what advantage a person is likely to derive from such an extract, who takes *one or two grains* of it per day, or even thirty or forty, with the hope of getting rid of a scirrhous tumor, or of any other disease.

OF WATER HEMLOCK (*CICUTARIA AQUATICA* OF *LAMK*, OR *CICUTA VIROSA* OF LIN.).

926. This plant belongs to the family of the *Umbelliferæ* of Jussieu, and to the Pentandria Digynia of Linnæus.

Characters. Flowers white, almost regular, and disposed in loose umbels: general involucellum none, or of one single leaflet: partial involucellum composed of several leaflets, which extend beyond the partial umbels; each flower presents an entire calyx; the petals are oval, entire, curved at the summit, almost equal: the fruit is egg-shaped, furrowed; each seed is convex on the outside, and furnished with five small ribs: stalk from three to eight decimetres in height, cylindrical, hollow, and branchy: leaves large, twice or thrice winged, and composed of lanceolated leaflets, somewhat narrow, pointed, and dentated like a saw. This plant grows on the borders of ponds, and in watery ditches.

ACTION OF WATER HEMLOCK ON THE ANIMAL ECONOMY.

Experiment 1st. *Wepfer* relates that half an hour after having given to a young dog more than an ounce of the root of Water Hemlock, cut into very small pieces, the animal passed a great quantity of saliva, vomited, had a mouthful of foam, and fell into very violent convulsions; at one time he presented an emprosthotonos, at another opisthotonos; he could not remain in his place; he staggered and fell down on his side. This situation continued two hours. The animal recovered his strength; a fresh portion of the root was given him; he passed a quantity of saliva immediately after, had a stool, and did not vomit; he lost his appetite, had convulsive movements from time to time, and when raised up, he immediately fell

down on the side. He lived until the third day. His death was preceded by great torments, and a considerable agitation. The stomach, which was contracted and puckered, contained only the entire roots, such as they had been ingested; the internal membrane, which was more red than in its natural state, presented near the bottom, where the small portions of the root were found, some spots of a livid red colour; the serous membrane corresponding to these spots, presented similar ones, but larger; the intestines, which were quite empty, were contracted, and as it were dried; the rectum was lined with a greenish mucosity; the bladder was small, empty, and in folds; the ventricles of the heart contained a great quantity of black concrete blood.

This experiment having been repeated by the same author on dogs, wolves, eagles, sometimes with the root, sometimes with the juice, of the Water Hemlock, furnished similar results; in general, it has been observed that the animal staggered a short time after the ingestion of the poisonous substance; that they were dejected or agitated, and that their heads trembled; some time after, they experienced thirst, and a frequent eructation; they rendered a great quantity of saliva, with a greenish foam; symptoms which were speedily followed by vomitings, diarrhœa, enuresis, and convulsions more or less violent. Amongst the animals submitted to these experiments, there was a very small number who experienced no accident at all. Those who died exhibited the digestive canal inflamed, corroded, and sometimes in a state of gangrene; the cavities of the heart were filled with blood, sometimes fluid, sometimes concrete; the lungs, which were frequently filtrated, and distended with blood, appeared to be inflamed; the liver presented the same appearance; the ventricles of the brain seemed to contain a little serosity; the vessels of this organ were distended with black blood.*

* Wepfer, *Cicutæ Aquaticæ Historia et Noxæ*, p. 135—176, anno 1679.

Observations.

1st. *Mæder*, six years of age, accompanied by a child of eight years, and by six little girls, ate some roots of Water Hemlock, which he took for parsnips. Soon after, he experienced anxiety of the præcordia, uttered a few words, lay down, and made water with considerable force; shortly after which he fell a prey to horrible convulsions, lost the use of his senses, and strongly closed his mouth: he gnashed his teeth, rolled his eyes about in an extraordinary manner, and rendered blood by the ears. He had a frequent hiccup; made efforts to vomit, without being able to open his mouth; he experienced severe pains in the joints; his head was frequently bent backward, and the whole back was arched so that a little child might with safety have crept through the space formed between his back and the bed. The convulsions having ceased, he implored the assistance of his mother: whatever means were employed, it was impossible to raise him; his strength diminished, and he expired about half an hour after the invasion of the symptoms. The abdomen and the face swelled up after death; a small degree of lividness was observed near the eyes; there flowed from the mouth a very considerable quantity of green froth, which continued to appear as fast as it was wiped away. Amongst the other children who had likewise eaten the roots of this plant, the six little girls experienced bad symptoms, and recovered; but the child of eight years of age, who took a tolerably large quantity, died.

2nd. In consulting the other observations given by *Wepfer* in the *Miscellanea Curiosa*, those of *Schwencke*, *Niedlinus*, &c. It will be seen that the following symptoms have been noticed: "Dazzling, obscurity of the sight, vertigoes, cephalalgia sometimes acute and excruciating, walk vacillating, agitation, anxiety of the præcordia, cardialgia, dryness of the throat, ardent thirst, eructation, vomiting of greenish matter, with fragments of the roots, respiration frequent and interrupted, tetanic contraction of the jaws, lipothymia, sometimes

followed by a state of lethargy, with coldness of the extremities; at other times a furious delirium, or attacks more or less approaching to epilepsy, especially in children and young girls, and they are then frequently terminated by death: in one or two cases only, a swelling of the face has been observed, with starting of the eyes. The most serious derangement of the nervous system has always been observed, so much the more rapidly as the quantity of the root swallowed has been more considerable, at least, unless a part of it had been quickly thrown up by vomiting. (GUERSENT, *Dictionnaire des Sciences Médicales*, article *Cigue.)*

927. It results from the preceding facts,

That the *Cicuta Virosa* or *Aquatica*, exerts upon men and upon dogs an action similar to that of the *Conium Maculatum*, but more energetic.

COMMON FOOL'S PARSLEY *(ÆTHUSA CYNAPIUM).*

928. This plant belongs to the family of the *Umbelliferæ* of Jussieu, and to the Pentandria Digynia of Linnæus.

Characters. Flowers white, forming flat umbels, very thickly furnished, and destitute of a general involucrum; partial involucella disposed on one side of the umbel, and turned downwards. Each flower has an entire calyx, the petals are unequal, curved into the form of a heart; the fruit is egg-shaped or oblong, streaked or furrowed: stalk five decimetres in height, branchy, smooth, and grooved; its leaves are all twice or thrice winged, and their leaflets are pointed and pintifid, or deeply indented.

This plant has often been confounded with parsley. The following are the characters which may serve to distinguish them: 1st. The leaves of the Fool's Parsley are of a blackish green on the upper side, and shining.

2nd. They have no smell when smelt to without being

bruised; but they give out a nauseous smell when rubbed between the fingers; parsley on the contrary, presents an agreeable odour.

3rd. Its root is smaller than that of parsley, and dies every year in autumn. This plant is common in cultivated grounds.

ACTION OF COMMON FOOL'S PARSLEY ON THE ANIMAL ECONOMY.

Experiment. On the 10th of June, at eight in the morning, about seven ounces of juice obtained from the leaves of this plant, were introduced into the stomach of a robust dog of middle size, and the œsophagus was tied. Twenty minutes after, the animal had some retchings. At half past eight, he did not appear very ill. All at once he extended his extremities, and lay down on his belly. A few minutes after he attempted to rise; all his efforts were in vain; the muscles of the limbs, especially of the inferior ones, refused to obey; the animal was lifted up, and instantly fell again. The organs of sense still exercised their functions; the pupils were dilated; the pulsations of the heart were slow and strong. This state of things continued for a quarter of an hour; when the extremities were agitated by convulsive movements; the animal might be placed, without deranging him, on either side; the organs of sense grew weak; the œsophagus and throat became the seat of spasmodic contractions. This state of stupor increased, and the animal expired at nine o'clock. He was immediately opened: the heart was contracted, and contained some fluid and blackish blood, even in the left ventricle; the lungs were somewhat less crepitating than in their natural state; the stomach was found full of the juice ingested; there was no alteration in the digestive canal.

Observations.

1st. A boy six years of age, having eaten of this plant at

four in the afternoon, which he took for parsley, began immediately to utter cries of anguish, and complained of cramps in the stomach. Whilst he was going from the country to his father's house, the whole of his body became excessively swelled, and had a livid appearance; his breathing became every moment more difficult and short. He died towards midnight. Another child, four years of age, who was poisoned in the same manner, was fortunate enough to vomit up the plant; that however did not prevent him from going out of his senses, and talking extravagantly; in his delirium he thought always of seeing a quantity of dogs and cats; and although the physician did not arrive till next day, he was fortunate enough to save him. (VICAT, op. citat. p. 255.)

2nd. RIVIERE relates, that a person died after having taken a quantity of this plant. On opening the body, the tongue was found black; a brownish serosity was found in the stomach; the liver was hard, and of a yellow colour; the spleen livid; the body was not at all emphysematous.

3rd. In examining attentively the symptoms observed by several practitioners in poisonings of this kind, they may be reduced to the following: heat in the throat, thirst, vomitings; sometimes diarrhœa; breathing short, and sighing; pulse small, and frequent; head-ache, vertigoes, numbness of the limbs, and delirium.

OF RUE *(RUTA GRAVEOLENS).*

Experiment 1st. On the 4th of June, at eight in the morning, six ounces of the juice obtained by triturating two pounds of the leaves of fresh Rue, with one ounce of water, were introduced into the stomach of a strong dog of middle size; the œsophagus was then tied. The animal had one stool during the day. The next day, he did not experience any remarkable symptoms. He died in the night. The

mucous membrane of the stomach was slightly inflamed; the other portions of the digestive canal were sound; the lungs presented no alteration.

Experiment 2nd. About eight ounces of the distilled water of Rue prepared from the dry plant, were introduced into the stomach of a small dog; the œsophagus was tied. He had experienced no other symptom than dejection, and died five days after the operation. The body was not opened.

Experiment 3rd. About eight ounces of the distilled water of Rue, prepared from a large quantity of the fresh plant, was introduced into the stomach of a small dog: the animal did not experience any accident. Six days after, he died dejected, probably in consequence of the ligature of the œsophagus.

Experiment 4th. Twelve drachms of the distilled water of Rue, prepared from the fresh plant, were injected into the jugular vein of a small lean dog. The next morning, the animal had not experienced any remarkable symptoms. The jugular vein of the other side was then laid open, and three drachms of the same fluid, mixed with eight grains of essential oil proceeding from a distillation in a water-bath of about eight pounds of the fresh plant, were injected into it. Two minutes after the injection, the animal vomited some yellow matter, and experienced vertigoes; he staggered like a person drunk with wine. At the end of twenty minutes, his posterior extremities appeared somewhat feeble. Six hours after, all the symptoms were diminished, and the next evening, the animal was perfectly recovered.

Experiment 5th. Three drachms and a half of the watery extract of Rue, prepared from the dry plant, were injected into the stomach of a small dog tolerably robust; the œsophagus was tied. He died at the end of the fourth day, and had exhibited no other symptom than the dejection inseparable from the operation. The mucous membrane of the stomach

presented two ulcers of the size of small lentils; there were here and there near the pylorus some blackish portions formed by black blood extravasated.

Bulliard says, " In a dose a little too strong, Rue causes a great agitation, fever accompanied by yawnings, a considerable dryness of the mouth, and a great pain in the throat. The skin, if it be handled any length of time, inflames, and the hands swell. (Op. citat. p. 150.)

929. It results from these facts:

1st. That Rue exerts a local irritation, capable of producing an inflammation, which in general has not appeared to us to be very severe.

2nd. That its essential oil, when introduced into the veins, acts like the narcotics, and that it is probable it exerts the same mode of action when introduced into the stomach; but that it possesses little energy.

OF COMMON OLEANDER (*NERIUM OLEANDER*).

930. This shrub belongs to the Pentandria Monogynia of Linnæus, and to the family of the *Apocyneæ* of Jussieu.

Calyx permanent, very small, with five linear and acute divisions: corolla monopetalous, funnel-shaped; its tube dilates insensibly; its border is large, open, and deeply intersected, in five obtuse and oblique divisions, furnished at their interior base with appendages resembling petals, coloured, dentated, split into two or more lobes, projecting outside the tube, and forming a fringed crown: five stamina inserted into the tube, the anthera of which are straight, close together, terminated by a coloured thread, or by silky tassels rolled up in a spiral, one over the other; one style simple, scarcely visible; its stigma, which is abrupt, is borne upon an annular ridge; germen superior and oblong; the fruit is composed of two conical follicles, terminating in a point, in which are

found the seeds clustered together, which cover one another like the scales of fishes: flowers terminal, and in loose clusters, of a rose colour, or white. The shrub is from eight to ten feet high; the stalk is straight, the bark purple, green, or grayish; the branches long, slender, and erect; leaves with short petioles, opposite, frequently ternate, lanceolated, somewhat narrow (they are nearly four inches long to nine lines of breadth in the middle), entire, pointed, smooth, stiff, of a dark green colour, having a strong rib on the lower side. The root is woody and yellowish, it gives out several stems that are straight and pliable. The whole plant has a bitter taste, extremely acrid.

ACTION OF COMMON OLEANDER ON THE ANIMAL ECONOMY.

Experiment 1st. At half past one, an incision was made on the back of a great dog; fifty grains of the watery extract of Oleander, moistened with a few drops of water, were applied to the cellular texture. At the end of ten minutes, the animal had vomited three times some yellowish fluid matter. Three minutes after, he had two stools and vomited again. These vomitings were repeated several times during the succeeding six minutes; then slight complaints, vertigoes, acceleration of the pulsations of the heart, weakness of the posterior extremities; head bowed forward as if it were difficult to support it; slight convulsive contractions of the right anterior paw. One minute after, the animal fell down without an effort on the side; his head was reflected backwards, and he became insensible to light and sound; the pupils were extremely dilated, the anterior right extremity presented from time to time some slight convulsive movements. He died in this state eight minutes after. The body was immediately opened: the heart was no longer beating; there was in the left ventricle a small quantity of blood of a deep red colour,

partly coagulated; that contained in the other ventricle was partly fluid, and partly coagulated; the lungs, which were of a rose colour, were somewhat less crepitating than in their natural state; the ventricles of the brain contained no serosity; the external vessels of this organ presented a livid colour, and were distended by a tolerably large quantity of venous blood. There was no alteration in the digestive canal, nor in the limb operated on.

Experiment 2nd. At a quarter past one, the experiment was begun again with forty-eight grains of the same extract. At the end of eight minutes, the animal vomited alimentary matter mixed with bile. Two minutes after, he vomited again, he passed two liquid stools, and experienced slight vertigoes. Twenty-six minutes after the operation, he made violent and fruitless efforts to vomit; his walk was staggering, his posterior extremities weak, and he fell down on the side, reflecting strongly his head backwards upon the trunk; the muscles of the lower jaw, which were agitated by convulsive movements, approached and separated alternately this bone from the superior jaw. The anterior extremities exhibited a continual trembling, and the posterior paws slight convulsive shocks; the organs of sense were insensible to external impressions. This state continued eight minutes, and the animal died. He was immediately opened: the blood contained in the cavities of the heart was fluid, and of a red somewhat deep in the left ventricle. The lungs and stomach presented no alteration.

Experiment 3rd. At twelve o'clock two drachms of the watery extract of Oleander, dissolved in two drachms and a half of distilled water, were introduced into the stomach of a small robust dog fasting, and the œsophagus was tied. Twelve minutes after, the animal had some nauseas, made some efforts to vomit, and experienced slight vertigoes; the pulsations of the heart were not more frequent than before the operation. At sixteen minutes after twelve, the stupefaction was so much

increased, that he appeared to be dead; he was lifted up, and fell down instantly on the side, like an inert mass of matter; he was insensible to all external impressions. Three minutes after, he reflected the head a little on the back; the anterior paws, and especially the right one, were agitated with slight convulsive movements, and he expired twenty-two minutes after the ingestion of the poisonous substance. He was immediately opened: the heart was no longer contracting; the blood which it contained was fluid, and somewhat of a deep red in the left ventricle; the lungs, which were rather less crepitating than in their natural state, were rose-coloured, and very little distended with blood; the stomach contained a certain quantity of the poison employed; the digestive canal presented no sensible alteration.

Experiment 4th. Four and twenty grains of the watery extract of Oleander, dissolved in four drachms of water, were injected into the jugular vein of a small dog. The animal immediately experienced very decided vertigoes, and was unable to walk. At the end of a minute, he vomited some fluid matter, of a yellowish colour, and exhibited a continual trembling in the posterior limbs; he was lying down upon the side, with the legs separated and extended, and the head somewhat bent backward; he uttered some plaintive cries; his pupils were excessively dilated, his eyes starting, that he could neither hear nor see; from time to time he made motions with the head as if he would attempt to rise; but he fell back again immediately. These symptoms lasted seven minutes, and he expired directly after, in a state of great insensibility and immobility. He was immediately opened: the heart was no longer contracting, and contained only some fluid blood; that in the left ventricle was of a blackish red colour: the lungs did not appear altered.

Experiment 5th. Thirty-six grains of the same extract, dissolved in four drachms of water, were injected into the jugular vein of a small robust dog, immediately the muscles

of the extremities were contracted, the paws separated, and the head bent backwards. Three minutes after, the stiffness ceased, the head was a little inclined towards the thorax, and the animal appeared completely stupified. He lived five minutes in that state, and death was preceded by a general trembling of all the muscles. He was immediately opened: the heart was motionless; the blood, which was of a red colour in the left ventricle, was fluid in each of the cavities of this organ; in the right ventricle however, were observed some very trifling *coagula,* which were blackish, and as it were composed of filaments; the lungs, which were crepitating and of a rose-colour, presented several blackish points.

Experiment 6th. A drachm of the same poisonous substance, dissolved in five drachms of water, was injected into the jugular vein of a very strong dog. Immediately the animal uttered acute cries, was considerably agitated, experienced vertigoes, and fell down on the side: he then stretched out and strongly agitated his paws; the head was reflected backward, and he ceased to complain. This state continued for two minutes, after which he became motionless, and as if insensible: he made two deep inspirations, and died four minutes after the injection. He was immediately opened: the heart was no longer contracting; the blood, which was tolerably abundant and fluid in both ventricles, was of a deep red in the aortic portion; the lungs were rose-coloured, and their texture somewhat more hard than in their natural state; the pulmonary vessels were empty.

Experiment 7th. Ten ounces of the distilled water of Oleander, prepared from sixteen ounces of the powder of this plant, were introduced at eight in the morning into the stomach of a robust dog; the œsophagus was tied. The next day at five in the evening, the animal had not presented any remarkable phenomenon. The following day at six in the evening, he experienced vertigoes. The morning after, at ten o'clock, he was lying on the side, in a state of great insensibility, and

exhibited some slight convulsive movements: he died three hours after. The ventricles of the brain contained a small quantity of a reddish serosity; the veins distributed over the external surface of this organ, were distended with black blood; the lungs, which were crepitating, were rather more red than in their natural state.

Experiment 8th. Six drachms of the same distilled water of Oleander, were injected into the jugular vein of a small robust dog. The next day the animal was in excellent health; he had not experienced any remarkable symptom; food was given to him. The following day, ten ounces of the same fluid were introduced into his stomach, and the œsophagus was tied. He died at the end of fifty hours, after having experienced vertigoes, and some convulsive movements.

The same experiment repeated on another animal, furnished similar results.

Experiment 9th. At twelve o'clock, an incision was made on the inside of the thigh of a small dog; the wound was sprinkled over with four drachms of the powder of Oleander, which had been slightly moistened; and the lips were united by a few stitches. Twenty minutes after, the animal vomited some bilious matter extremely yellow: these vomitings were repeated at the end of four minutes. At half past one, he was laboring under the symptoms reported in experiment 3rd, and died ten minutes after. The dissection, which took place the next day, did not discover any sensible lesion.

Experiment 10th. At eleven o'clock, four drachms of the same powder were introduced into the stomach of a small and very strong dog, and the œsophagus was tied. At half past twelve, the animal made some efforts to vomit; his walk was unimpeded, and he preserved the use of his senses. At three quarters after one, he experienced vertigoes, and the other symptoms which have followed the use of this extract (*Vide* the preceding experiments), and died twenty minutes after. He was opened at three: the blood contained in the

ventricles of the heart was fluid; the lungs were rose-coloured and crepitating; the stomach contained almost the whole of the powder ingested, which was recognisable by its physical properties. There was no alteration in the digestive canal.

OBSERVATIONS.

1st. *Libautius* asserts that a person died in consequence of being shut up in a room to sleep, where there were some flowers of this plant. Another person, who ate some meat roasted on a spit made of this shrub, experienced considerable agitation, became mad, had a syncope, and died. (LIBAUTIUS, *Comment. de Venenis;* SCHENKINS, *de Venenis.*)

2nd. *M. Gronier* has administered three drachms of the powder of Oleander to a she-ass, which was extremely feeble; the animal seemed to be very considerably excited. A vigorous horse, who had taken the same poison, fell into a state of dejection; he fell asleep, and expired eighty minutes after. (*Memoire lu à la Société de Médecine de Lyon,* en 1816.) Sheep die in a very short time, after having drunk the water in which the leaves of Oleander have been macerated.

931. It results from the preceding facts,

1st. That the watery extract of this plant, when applied to the cellular texture, or introduced into the stomach, is a very active poison, and that it acts with considerably more rapidity and energy, when injected into the veins;

2nd. That the powder possesses also poisonous properties, but in an inferior degree;

3rd. That the distilled water is still less active than the powder; that these different preparations are absorbed and act upon the nervous system, and especially on the brain, after the manner of the stupifying poisons;

4th. That they almost constantly produce vomiting;

5th. That independently of these phenomena, they excite a slight local irritation.

OF THE *UPAS-TIEUTÉ.*

932. The *Upas-tieuté* brought from Java by *Leschenault*, is nothing else than the extractive juice of a plant of the vine kind, of the family or genus of the *Strychnos*, (a small group ranged by M. de Jussieu, next to the *Apocyneæ*). The word *Upas* signifies a vegetable poison, and the natives of Java employ two species of it, for the purpose of rendering the wounds of their arrows mortal: the first is the *Upas-tieuté*, which is produced by a climbing plant; the second is called *Upas-antiar*, and is the produce of a large tree. These two species have been greatly confounded by writers, under the names of *Boa*, or of *Bohon-upas*.

ACTION OF *UPAS-TIEUTÉ* ON THE ANIMAL ECONOMY.

Experiment 1st.* When small pieces of wood, of the size and form of an ordinary quill, are covered with the *Upas-tieuté*, and the extract is left to dry upon their surface; and these are forced into the muscle of the thigh of a dog, it is observed that, at the end of two or three minutes, the animal experiences a general uneasiness, and seeks the corners of the room; almost immediately after, all the muscles of the body contract, the vertebral column straightens itself, and the anterior feet for a moment quit the ground. This contraction is only momentary, the animal becomes quiet for a few seconds;

* My friend *Dr. Magendie*, who has already enriched physiology with several important labours, read, in 1809, to the Institute, a very fine memoir, in which he has first spoken of the effects of this substance on the animal economy. The experiments which form the subject of it, were made by him, and *M. Delille*, a distinguished botanist, and a member of the Institute of Egypt: I have since repeated them, and found them extremely correct.

then a second general contraction takes place; this is more decided than the first, and of longer duration; the straightening of the vertebral column is more sensible; the breathing accelerated. These symptoms cease on a sudden, the breathing becomes slower, the animal appears as if astonished. To this calm, which scarcely lasts a minute, succeeds again a strong general contraction; the anterior limbs, which are stiff, and closed together, are directed backwards, the breathing is considerably accelerated, the vertebral column straightened, and the head strongly elevated, and bent backwards on the neck. The breast being no longer supported, the animal, threatened by a fall, runs rapidly upon his hind legs, whilst a more intense contraction manifests itself; the muscles of the spine elevate the breast and head, the posterior limbs become stiff and motionless, the animal falls, first on the lower jaw, and soon after on the side. He then exhibits a complete tetanus, with immobility of the thorax, and cessation of respiration; the tongue and gums, which are of a violet colour, announce a state of asphyxia. This state continues about a minute, then the tetanus disappears on a sudden, and the asphyxia a little at a time, in proportion as the breathing is restored. During this paroxysm, the animal preserves the use of his senses, and of the functions of the brain; it is not till the asphyxia is carried to the highest degree, that the action of these organs begins to weaken. At the end of another minute, fresh general contractions, so intense, that the floor experiences an evident trembling. This shock may be compared to that which takes place, when a current of galvanic fluid is directed along the spinal marrow of an animal recently killed; it is accompanied by asphyxia, and a little before it disappears, convulsive movements are observed in the face. The touching of any part of the body whatever, produces easily this general tetanic stiffness; the animal dies five, six, seven, or eight minutes after the first attack. The state of the internal organs proves that he has died of an

asphyxia; the examination of the wound shews that the poisonous substance has introduced itself into the muscles; and every part with which it has come in contact is tinged of a brownish yellow colour. Horses and rabbits furnish the same results, only that the attacks of tetanus are more numerous in those who are vigorous and adult.

Experiment 2nd. The right thigh of a dog was amputated, leaving the traces of the crural vein, and artery near the pelvis; those vessels were detached from all the surrounding parts, which had been cut; the vessels divided in the operation were tied; the femur was sawed through, so that the circulation was only carried on in the thigh, through one vein and one artery; linen and saw-dust were placed between the divided surfaces, in order to prevent their communication. A point of wood, furnished with three grains of *Upas*, was forced into the isolated limb near the ham; the animal experienced an attack of tetanus, at the end of ten minutes; this attack was repeated, and he died fifteen minutes after the invasion of the symptoms.

Experiment 3rd. A small quantity of *Upas* was dissolved in water, and injected into the peritonæum of a dog. Twenty seconds after the injection, the animal presented all the symptoms which we have described, and expired at the end of the third attack.

Experiment 4th. Forty drops of *Upas*, dissolved in water, being injected into the pleura of an old bay horse, gave rise almost immediately to tetanus and asphyxia, and the animal died after the second attack.

Experiment 5th. A portion of small intestine was drawn out of the abdomen of a dog, two ligatures were placed at eight decimetres one from the other, and a small opening was made in the intestine, near to one of the ligatures; eight drops of *Upas*, diluted with two grammes of water, were then injected into its cavity; a third ligature was made in order to prevent the solution from escaping, and the intestine was

reduced; the edges of the wound in the abdomen were united by a single point of suture. The attacks did not begin till after the expiration of six minutes, and the animal did not die until the fifteenth of them.

When injected into the great intestine, the bladder, or vagina, the *Upas* has always produced death, with the signs of a slow and feeble absorption.

Experiment 6th. The same operation was repeated on another dog, in such a manner, as to preserve only one single vein, and one single arterial branch, given out from the mesenteric branches to the isolated portion of intestine; all the other vessels distributing blood, and receiving chyme, the nervous filaments, and the portion of the mesentery corresponding to the same part of intestine, were tied, on one part, next the curvature of the gut, and on the other, near to the centre of the mesentery, and all that was comprehended between the ligatures, was cut. Five drops of *Upas,* and two drachms of water, were injected through a small opening made in the portion of intestine; a ligature was made above the opening, to prevent the rejection of the fluid. There was no contact of the poison with the peritonæum; the intestine was replaced, and the abdomen united by suture; eleven minutes after, the attack of tetanus came on, and the animal died.

Experiment 7th. After having made an incision into the abdomen, the right extremity of the stomach was drawn out; a ligature was placed at the distance of one centimetre to the left of the pylorus, and a slight incision was made in the stomach near the ligature; about two grains of *Upas* dissolved in water, were then injected into this viscus. A second ligature was opposed to the ejection of the fluid, and the external wound was united by a single point of suture. The attack of tetanus did not take place till after the expiration of an hour.*

* In the dissection of the animals which form the subject of all these experiments, the slightest local irritation could never be discovered.

Experiment 8th. Eight drops of the solution of *Upas* were injected into the jugular vein of a vigorous horse. The animal instantly fell a prey to an attack of tetanus, which put an end to him in less than three minutes. Twelve drops of the same poison were injected into the crural artery of a dog; the effects on the spinal marrow were not sensible till seven minutes after the injection.

Experiment 9th. A small quantity of *Upas* was injected into the carotid artery; at the same moment the intellectual functions were perverted; the head was placed between the fore paws; the animal rolled himself up in a ball. These effects were soon after quieted, and the animal then fell a prey to all the symptoms which result from the action of *Upas* upon the spinal marrow.

Experiment 10th. Some Upas was introduced into the thigh of an adult and vigorous dog, and the spinal marrow was divided between the occipital, and the first cervical vertebræ, at the moment when the animal experienced a strong tetanic contraction. Not only did the paroxysm not subside, but four fresh attacks took place in the course of the fifteen minutes which succeeded.*

Experiment 11th. The spinal marrow was divided behind the occipital, and eight drops of *Upas,* mixed with four grammes of water, were injected into the pleura of the left side. The symptoms shewed themselves with the same degree of intensity, and with the same promptitude, as if the section had not taken place: they continued as long as the circulation was kept up.

Experiment 12th. Eight drops of Upas, diluted with water, were injected into the pleura of a small dog; at the same

* It is perfectly well ascertained, that the circulation goes on still, during fifteen, twenty, twenty-five minutes, in animals, whose spinal marrow has been divided, provided that they be young and vigorous :—it ceases on the contrary, almost at the instant, if they be enfeebled by age, defect of nourishment, or any other cause.

moment, a piece of whalebone was forced up the whole length of the vertebral canal: the whole of the spinal marrow followed the whalebone, when it was withdrawn. Ten minutes after the destruction of the marrow, the circulation was still very perceptible, and no contraction had taken place.

Experiment 13th. The same quantity of *Upas* was injected into the peritonæum of a dog; the moment the tetanus came on, the whalebone was forced into the vertebral canal, beginning by the first vertebræ of the neck; the tetanus ceased in the fore feet, when the whalebone arrived at the dorsal region; it continued, on the contrary, in the posterior extremities, which ceased to contract when it arrived at the caudal extremity of the vertebral canal.

Experiment 14th. Eight drops of Upas, diluted with water, were injected into the cervical portion of the vertebral canal: immediately after, a stiffness declared itself in the fore feet, which continued more than six minutes, with very strong exacerbations; the hind legs remained flexible, and as in their natural state; towards the end of the sixth minute they partook of the general stiffness; at the tenth minute, the anterior extremities were no longer stiff; the posterior continued to be so, but they shortly after relapsed.

Experiment 15th. A very vigorous shaggy dog was debilitated; afterwards the vertebral canal was cut transversely, with the spinal marrow, near the lumbar region; six drops of Upas were injected into the part of the canal, which answers to the loins and pelvis. Immediately the posterior limbs exhibited some stiffness, and presented during ten minutes the effects of the Upas: it was only at the eleventh minute, that some feeble contractions were perceived in the anterior limbs.

Experiment 16th. The Upas was applied to the lumbar portion of the marrow: the posterior limbs only experienced tetanus. A few minutes after, the poison was applied to the cervical region of the canal, and at the same moment the pectoral limbs entered into a state of contraction.

Experiment 17th. The superior part of the sciatic nerve, for about the extent of an inch, was detached; it was raised with a small plate of lead passed underneath it; a few drops of *Upas* were poured upon the nerve; it was then opened longitudinally, and the drops were insinuated into its texture. No other symptom took place than that of pain in the wounded nerve, and the cure was afterwards effected.

OF NUX VOMICA.

933. Nux Vomica is the seed of the *Strychnos Nux Vomica*, which Linnæus has ranked in the Pentandria Monogynia, and which is found at the end of the family of the *Apocyneæ* of Jussieu. The tree, which produces these seeds, grows in Ceylon, upon the coast of Coromandel, and in Malabar; it acquires a very considerable height, and its circumference is sometimes about twelve feet.* It is fond of sandy grounds.

The Nux Vomica is round, about an inch in breadth, flattened, and from two to three lines in thickness. There is towards the centre of its two surfaces a sort of umbilicus: some silky threads of an ash colour, or yellowish, or transparent, or blackish, very short, very close, and fixed obliquely between a thin and bitter pellicle, which envelopes the peri-

* Flowers in a corymbus, not very numerous, small, exhaling a disagreeable smell: calyx of five divisions, caducous: corolla a tube, border open, five divisions, of a greenish colour, four or five stamina, the filaments of which are of a pale green, and the anthera of an oblong form: style single, which rises above the stamina, and bears a stigma not very thick: berry single, or multiplied, round, without down, at first of a green colour, then of a golden yellow; is of the size of an orange, having one single cell containing the seed: roots thick, bitter, and covered with a yellowish bark: bark of an ash colour, blackish, and knotty, which afterwards grows red, and has a bitter taste: leaves broad and entire, opposite, inserted obliquely; their disk flat, oblong, broadish in the middle, presenting five ribs; they are of a deeper green colour on their inferior surface.

sperm, cover the whole surface of this seed. The disposition of these silky hairs is such that they are all directed from the centre to the circumference, or those of one of the surfaces appear to cross those of the other. On the circumference of the seed is observed one point somewhat more projecting than the rest: it is that from which the young plant would proceed. The perisperm is of a brown yellow colour, or of a white verging towards green, and hard; it presents in its interior, when opened, a large cavity intended to lodge the embryo during its first developement: the sides of this cavity are in contact, and are of the thickness of about a line throughout.

The *Strychnos Colubrina* furnishes also the Nux Vomica.

ANALYSIS OF NUX VOMICA BY *M. CHEVREUL.*

Acidulous malate of lime, gum, vegeto-animal matter, bitter matter, fixed oil, colouring matter, which was yellow, and probably starch, which could not be directly extracted on account of its desiccation; earthy and alkaline salts, woody hairs, and wax, which appears to preserve the perisperm from humidity.

ACTION OF NUX VOMICA ON THE ANIMAL ECONOMY.

Experiment 1st. A dog of middle size was made to swallow somewhat less than half a drachm of Nux Vomica mixed with honey. Three quarters of an hour after, the animal had convulsive movements in the posterior limbs, which were separated from one another, and pushed forward so that the dog rested upon his heels. All at once he rose up, stretched out strongly his limbs, and separated them: he made several bounds, as if all of one piece; the neck and back were in

a state of tetanic stiffness, and were curved backwards; the tail was brought under the belly: he fell down again afterwards on the feet, touching the ground only with the extremity of his toes. A short time after, he fell down on the side; tremblings, tail extended straight; at last relaxation of all the muscles. The animal had a second attack, which began by convulsive movements of the face, mobility of the eyelids, whilst the eyes, which were immovable from the tetanic contraction of their muscles, were starting out of their orbits. Shortly after, general tetanic stiffness. He might be raised up all in one piece; general trembling; the tongue was projected out of the mouth; it was of a violet colour, as well as also the lips; the respiration was suspended by the tetanic contraction of the muscles of the thorax; general relaxation. In the attacks which preceded death, respiration was carried on during the paroxysm, and then the tongue and lips returned to their natural colour. He expired at the fifteenth attack, twenty-eight minutes after the invasion of the symptoms, and preserved all along the use of his senses. The intensity of the symptoms might be increased, and even the attacks brought on by touching him, threatening him, or making a noise; but these means did not excite the convulsive movements of the face. A few moments before death, the breathing became somewhat noisy, as if the animal had the rattles.

Dissection. There was no vestige of inflammation in the digestive canal, nor in the respiratory organs, nor in the brain; the cerebral sinuses appeared somewhat more distended than in their natural state; almost the whole of the Nux Vomica was contained in the stomach; the heart contained blood which was blackish and somewhat coagulated, especially in the right auricle.

This experiment, repeated upon another dog, furnished similar results, except that the animal, who was weaker, was not affected till an hour after the ingestion of the Nux

Vomica, and that he lived an hour, dating from the moment of the attack; in general also the symptoms were more decided.

Another small dog, who swallowed twelve grains of Nux Vomica in lumps, experienced symptoms similar to the preceding, half an hour after the ingestion, and died at the end of twenty-five minutes.

Bonetus has detailed experiments made upon young dogs, the results of which bear a great relation to those we have just described. (*Theophili Boneti Sepulchretum*, tom. iii. p. 497. *Lugduni*, 1700.)

Experiment 2nd. A frog of middle size was made to take three grains of Nux Vomica rasped, and mixed with honey. A quarter of an hour after, the breathing was accelerated, and the belly swelled; the trunk was straightened whilst the eyes were sunk in; the feet were in their natural state, and the animal made a slight noise. He remained quiet during a few minutes, then had three other attacks, separated by a like interval of repose, and distinguished by the same phenomena, but more decided. *Fifth attack.* Convulsive movements, and considerable stiffness of the limbs and trunk; the animal might be turned about all in one piece: the duration of the movement of flexion was extremely short compared to that of the extension: touching, agitation, shaking of the floor, produced these effects. It was impossible to ascertain the state of vision, on account of the continual movements of the eyelids. The stiffness diminished in intensity; the action of the thoracic limbs was extinct, whilst the paws were still exercising their movements.

Dissection. The mouth and œsophagus were filled with thick mucosities; the major part of the boluses ingested were stopped at the superior orifice of the stomach; there was also a small quantity in this viscus; the portions of the œsophagus and of the stomach upon which the poison had been applied, presented a red colour; the membrane which envelopes the

cerebellum, and the first part of the spinal marrow, exhibited veins somewhat more distended than in their natural state.*

Experiment 3rd. *M. Lesant,* an apothecary at Nantes, gave to dogs and cats of different degrees of strength, the watery extract of Nux Vomica in the dose of from one grain to four; the animals have constantly died within less than ten minutes, when the poison has been administered to them in a watery solution, and at the end of three or four hours only, when they have taken it in the form of pills, and inclosed in meat. A very strong dog, after having taken four grains of this extract in meat, and after having experienced horrible convulsions during an hour, was capable of being recalled to life. He was made to take a large quantity of oil and vinegar. *M. Lesant,* who was so good as to communicate to me this note, is of opinion, that the animal did not owe his recovery to these fluids.

Experiment 4th. Twelve grains of the watery extract of Nux Vomica were injected into the pleura of a dog. At the end of one minute, the animal had an attack of tetanus; the section of the spinal marrow below the occipital vertebra did not put an end to the paroxysms; he had two others before he died.

Experiment 5th. Six grains of the same extract, dried on to the end of a small pointed piece of wood, were forced into the muscles of a dog's thigh. Tetanus came on at the end of half an hour; the animal had more than twenty paroxysms, and died forty minutes after the operation.†

* These experiments have been made by *Dr. Desportes (Vide Dissertation Inaugurale soutenne à la Faculté de Médecine de Paris,* l'an 1808.) They agree with those which *M. M. Magendie* and *Delile* have since made on the same subject, and which I have repeated with great care. *Wepfer,* in his work on Water Hemlock, renders an account (p. 134, et. sequent.) of the results which he has obtained in administering Nux Vomica to dogs and to cats; he compares the symptoms to paroxysms of epilepsy, and he affirms that there is a suspension of vision, hearing, and touch.

† *M. M. Magendie* and *Delile,* from whom we have borrowed these facts,

Experiment 6th. A small piece of wood was coated with a grain and a half of resinous extract of Nux Vomica, and the thigh of a dog was pricked with it; tetanus came on at the end of seven minutes, and the animal died five minutes after the attack.

Experiment 7th. Another dog, and some rabbits, which were wounded with the same poison, died very quickly of tetanus and asphyxia.

Experiment 8th. An ounce of a decoction prepared with ten grains of Nux Vomica, and twenty-four ounces of water reduced to about eight ounces, was injected into the pleura of a young dog. The injection was scarcely terminated when all the symptoms above described took place, and the animal died in less than one minute. The pleura presented no trace of inflammation.

Experiment 9th. Two ounces of the same decoction were injected into the peritonæum of a dog of middle size. At the end of one minute, invasion of the symptoms; the animal had two paroxysms less violent than those of the preceding experiment, and died one minute after. The peritonæum and the other organs were sound.

Experiment 10th. A little more than half an ounce of the same decoction was injected into the jugular vein of a great dog. A few moments after, the animal had some convulsive movements, and at intervals, a rigidity similar to that of tetanus: the crural artery was rendered extremely tense; its pulsations very slow. The animal died in a very short time. There was no alteration in the vessels.

Experiment 11th. About three ounces of the same fluid were injected into the cellular texture of the back of a great dog. At the end of five minutes, the animal began to separate the posterior limbs from one another; their movements were

as well as the two which follow, have observed that the watery extract of Nux Vomica was not hurtful when introduced in a fluid state into wounds, and that it only acted when forced in between the muscles.

become stiff and difficult, the tail was drawn under the belly; he appeared to be extremely uneasy: shortly after, invasion of rigidity similar to that of tetanus, accompanied by the nervous symptoms before described. He died at the end of the second paroxysm. The cellular texture, which was infiltrated by the fluid injected, presented no redness.

Experiment 12th. A small dog was made to take a bolus made with crumb of bread and two grains of the bitter principle of Nux Vomica, united with a little oil and sugar. At the end of seven minutes, the animal contracted all his external muscles, made a leap forward, which might be compared to the action of a spring, and fell down on the side, the head being strongly reversed backwards, his tail elevated, the paws stretched out; the breathing was suspended, and consequently the tongue and lips were of a violet colour; general trembling; the organs of sense performed their functions; emission of urine. To this state succeeded a relaxation, during which the breast was a little elevated and depressed. Shortly after, invasion of the second and last paroxysm with the same symptoms, but less feeble. Towards the end of this paroxysm, there were some convulsive movements of the lips, and a general relaxation; the animal made one or two deep inspirations and died. The two paroxysms only endured one minute.

Dissection. The tongue and lips were slightly tinged violet; no lesion of the digestive canal; the bladder filled with urine; the left cavities of the heart, the two *venæ cavæ*, and the jugulars, were strongly distended with blood.

Experiment 13th. Eighteen grains of the same bitter principle were dissolved in half an ounce of water, and injected into the bladder of a dog of middle size: a ligature was applied to the penis, to prevent the escape of the fluid. Ten minutes after, the animal fell into a very strong paroxysm of tetanus. This attack was repeated several times, and the animal expired twenty minutes after the injection. The brain, the spinal marrow, and the membranes which envelope them

were sound: the bladder and the digestive canal presented no alteration; the interior of the veins was not inflamed; the cavities of the heart and the venæ cavæ were distended with blood.

Experiment 14th. A small dog was made to swallow two grains of the oil of Nux Vomica (obtained by alcohol), enveloped in crumb of bread. At the end of two hours and a quarter, a separation of the legs took place, with stiffness of the movements at intervals; three hours after, he was found dead. There was no alteration in the organs.

Experiment 15th. Three nuts of this plant were given to a goat of one year old; one part was chewed by the animal, which excited considerable salivation; he had a frequent desire to pass urine, and several convulsive bleatings. The next day, the animal was recovered; he was made to take six drachms of the same substance, and no accident succeeded. He ate afterwards at several different times, some balls prepared with this poison, and was not at all incommoded by it. He was killed four days after the first ingestion, and a few pieces of the Nux Vomica were found in the stomach untouched.

Experiment 16th. *M. Desportes* gives the following detail of the action of Nux Vomica upon a fowl: "from the fourth to the twenty-second of May, a black fowl, a year old, in good health, and whose crest and caruncles were of a bright red colour, was made to take every day, Nux Vomica in small pieces. The experiment was begun with one grain, and there were added successively each day, to the evening dose, the quantities following; 1st. The first four days, one grain. 2nd. The four following days, four grains. 3rd. The four days which came after, the quantity of eight grains. 4th. During four days more, that of twelve grains. 5th. Lastly, sixteen grains in the four last days. For the rest, the following are the days and quantities corresponding: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23rd, May; 1, 2, 3, 4, 8, 12, 16, 20, 28, 36, 44, 52, 64, 76, 88,

100, 116, 132, 148, 164 grains. So that she took in the whole 1,114 grains of Nux Vomica in substance, that is to say, ninety-two times the dose necessary for killing a dog. The animal was always carefully fed.

" Now the following are the effects produced:—from the 4th to the 16th of May, no apparent change in her situation; from the 16th to the 18th, diminution of appetite; the fowl pecks on the side of the grain, two or three times before she is able to seize it; excrements of a deep green colour. On the 19th, she no longer ate, the red colour of the crest less bright. The 20th, and the 21st, the same symptoms; besides diminution and slowness of motions, stiffness of the limbs. 22nd. Ardent thirst, movements extremely difficult, slight stiffness of the limbs, impossibility of keeping upon her feet; a kind of drowsiness, from which she is easily roused, and during which the feathers are somewhat bristled; Diarrhœa; the crop is felt to be very much distended by the substance, which she has been obliged to take. The 23rd, the same symptoms, but more decided. On that day, foreseeing that the extreme distention of the crop would not permit me to give the next day a fresh dose, and beside being pressed for time, I decided, about three hours after she had swallowed the 164 grains of Nux Vomica, to make her take somewhat less than half an ounce of water, holding in solution about four grains of the bitter principle, united with sugar and a little oil. Scarcely had a minute elapsed when the fowl, who was in the act of incubation, rose up all at once with the wings extended, the tail expanded, all the feathers bristled, the feet in a state of strong distention, the claws only touching the ground; the eyes fixed, the beak open: she fell almost immediately upon the back; general trembling, the wings folded and pressed strongly against the body, continual movements of extension and flexion of the legs, the neck drawn down upon the back with a tetanic stiffness, the eyelids opening and shutting alternately, which occurred so frequently, that I could not

assure myself whether she could see. Three cries, but feeble; the beak at one time open, another time shut. The breathing at first suspended, with a livid discolouration of the crest, and of the caruncles: lastly, relaxation general and very short, with a hurried respiration. Return of the convulsions, with the breathing still hurried; successive decreasing of these symptoms; death a few minutes after the invasion.

"*Examination of the body.* The brain, trachea, lungs, heart, and vessels exhibited nothing particular, as likewise the œsophagus. The crop was greatly distended and filled with pieces of the Nux Vomica no ways altered, some grains of corn, and a small quantity of fluid; the whole of this mass had a sour smell. The membranous stomach and the gizzard contained portions of Nux Vomica very greatly altered; the others only beginning to be so by the digestive action of these organs; the intestine contained a chymous matter; each cœcum and the colon, a greenish matter. The mucous membrane of all these parts, as well as that of the *Oviduct*, presented no trace of inflammation. No alteration in the colour of the bile. The animal was become somewhat lean.

"The whole of the digestive apparatus was carefully separated from the body, and was given to a young spaniel of four months, who did not appear to suffer any thing from it; he preserved on the contrary, all his gaiety and love of play. On the evening of the third day, some person threw him the intestines, and he died in the night. He was opened the next day, and there were found in the stomach, all these parts nearly entire. It appears that he had swallowed them almost without tearing them. A few fragments of the Nux Vomica were found; the rest of the alimentary canal of the dog, was empty excepting the last portion.

Observations.

1st. *Hoffmann* reports that a young girl ten years of age, labouring under an obstinate quartan fever, took at two doses,

fifteen grains of Nux Vomica. She died in a short time; after having experienced extreme anxieties, and having made some efforts to vomit. (*Med. System*, tom. iv. cap. viii.) My pupil *M. Bell*, a young English physician, assured me that a similar accident had lately taken place in England.

2nd. A person swallowed in the morning, a scruple of Nux Vomica in powder, and drank afterwards a few glasses of cold water, in order to diminish the bitterness occasioned by this substance. Half an hour after, he appeared to be drunk; his limbs, and especially the knees, were stiff and tense; his walk was staggering, and he was afraid of falling. He took some food, and the symptoms disappeared without his having had either stools or vomiting. (*Veckoskrift for Lakare.*)

The same author reports that a woman had convulsive movements, and a cardialgia of long duration, after having taken Nux Vomica.

3rd. The administration of Nux Vomica, and of the root of Gentian to a woman affected with intermitting fever, was followed by dangerous convulsions, cold, and stupor of almost every part of the body. (SCUTTER, *Diss.* § 11.)

OF THE BEAN OF *SAINT IGNATIUS.*

934. This seed appears still to belong to the genus *Strychnos*, at least the tree which produces the fruits in which it is contained presents, in the flowers and leaves, the same parts, and the same disposition as the *Strychnos Nux Vomica.* Some botanists make a separate genus of it, which they call *Ignatia*, and a species of which, the *Amara*, would furnish the bean, which we are speaking of. Be it as it may, this seed is irregular, more or less angular, hard, having a kernel, and extremely bitter.

ACTION OF THE BEAN OF *SAINT IGNATIUS* ON THE ANIMAL ECONOMY.

Experiment 1st. A dog of middle size was made to swallow half a drachm of the bean of *Saint Ignatius,* rasped and mixed with butter. At the end of five minutes, he began to pant. Fifteen minutes after, he straightened himself out from time to time in a convulsive manner. The poison had scarcely been ingested half an hour, when the animal was carried rapidly forward, and fell down in a paroxysm of tetanus, first upon the chest, afterwards upon the side; the limbs and the neck were in a state of tension, the mouth of a violet colour; he preserved the use of his intellectual faculties; had an emission of urine; in fine, he had ten attacks, several of which had been provoked by noise or touching him, and he died in a state of asphyxia, at the end of twenty minutes.

Another dog, who had taken only ten grains of this poison, died at the fourth attack, three hours after its ingestion.

Six grains of this seed have proved sufficient to kill a dog in half an hour: this animal had drank water after having swallowed the poison.

Experiment 2nd. The extract of the bean of *Saint Ignatius,* injected into the veins, the pleura, the peritonæum, or applied externally, acts like the Upas, or extract of Nux Vomica.

Observations.

Camelli reports in the Philosophical Transactions of London, tom. xxi. p. 88. ann. 1699, that a dyspeptic man, who was attacked by vomiting, and Diarrhœa, took a scruple of the bean of *Saint Ignatius,* which occasioned him itchings and terrible convulsive pinchings; he was not able to stand; his jaws were locked; the muscles of the face performed movements, which might be compared in a certain degree to those made in laughing.

935. We do not take notice here of the *Strychnos Potatorum*, nor of another species of *Strychnos* known under the name of *Pomme de Vontai*, because the juice and seeds of this plant do not possess any poisonous properties, according to the experiments of *M. M. Magendie* and *Delile (Dissertation Inaugurale de M. Delile, soutenue à la Faculté de Médecine de Paris, 6 Juillet*, 1803.

CONCLUSIONS ON THE EFFECTS OF THE *STRYCHNOS*.

1st. The Upas-tiéuté, Nux Vomica, and the bean of *Saint Ignatius* are poisons extremely energetic for a very great number of animals, and for the human species.

2nd. They ought to be regarded as substances producing excitement on the spinal marrow, on which they act, by producing tetanus, immobility of the thorax, and consequently asphyxia, of which the animals die.

3rd. With whatever part of the surface of the body, they may be brought in contact in a suitable manner, they are absorbed, carried into the circulation, and the absorption appears to be effected through the medium of the veins, as *M. Magendie* has first observed. (*Vide* his excellent *Memoire* on *Absorption.*)

4th. Their action is extremely prompt, when injected into the pleura, peritonæum, or jugular vein: it is less so when applied externally, or when injected into the arteries, at a distance from the heart. Its effects are still longer in making their appearance, when applied to the mucous surfaces.

5th. Their action is null, when the spinal marrow is removed by means of a piece of whalebone.

6th. The watery extracts of Nux Vomica, and of the bean of *Saint Ignatius*, are more energetic than the powders of these seeds; but they are less so than their resinous extracts.

7th. None of these poisons produce inflammation of the textures to which they are applied.

OF THE *ANGUSTURA PSEUDO-FERRUGINÆA.*

936. There is found abundantly in commerce, a particular bark, which the druggists designate by the name of fine *Angustura*, and which differs essentially from it. We are of opinion that it is so much the more important to make known its characters, as it ought to be ranked amongst the most energetic poisons in the vegetable kingdom ; whilst the real Angustura might be taken in a strong dose without inconvenience. *M. Planche*, a distinguished apothecary and chymist of this capital, who has written a very excellent work on the natural history of these barks, has presented to M. M. *Pessieu* and *Bonpland*, the species which we are here treating of, and they have declared that they know not to what vegetable it could belong.*

The learned traveller *M. de Humboldt*, who has been so good as to communicate to me several particulars relating to the poisons of America, has told me that he did not believe that the bark of the *Angustura Pseudo-Ferruginæa* belonged to a tree of the same species as the real Angustura, which he has called *Bomplandia Trifoliata.*

Characters of the bark. The barks of this species are in general rolled up, of a yellowish grey colour on the inside. Some of them have the epidermis scattered over with whitish excrescences ; others are covered with a matter which has the appearance of rust of iron, and which possesses certain properties of it ; other barks are more or less polished, sometimes very rugged, and scattered over with spots of various colours ; these latter are, in general, more thick, and more bulky than the others ; and although they differ in appearance, they possess the same chemical properties ; they are only

* *Notice Chimique sur les Angustures du Commerce*, read before the Society of Medicine of Paris, the 2nd June, 1807, by L. A. Planche.

somewhat more ferruginous. The powder of this false Angustura is of a gray colour, similar to that of ipecacuanha, and of a smell resembling that root. It is so bitter, that a great many persons cannot taste it without experiencing nausea.

937. If this powder be macerated with water in the same proportions, and during the same time as the real Angustura, a liquor will be obtained, which, when filtered, has a pale straw colour, that is not perceptibly altered by the contact of the atmosphere, of an insipid smell, and a bitterness, which may be compared to the powdered bark, furnishing a black gray precipitate with the sulphate of iron, and, with the nitrate of silver, a white precipitate, which, in the course of five or six minutes, passes wholly into a black. The sulphate of copper forms with it a precipitate less coloured and more copious than with the true Angustura; it is not rendered turbid by the solution of glue.

938. Water sharpened with muriatic acid, and agitated with the powder of this false Angustura, puts on a beautiful colour of a clear green, if an alkaline prussiate be poured upon it, and a short time afterwards it throws down prussian blue. It is necessary to remark that a very beautiful prussian blue may be obtained at the moment, if the yellow powder which covers the bark, be treated by the muriatic acid; which proves evidently that this matter is of a ferruginous nature. This singular phenomenon is not observed with the real Angustura bark.

939. The decoction of the ferruginous Angustura is higher coloured than its water of maceration; so long as it is hot, it is transparent, and becomes turbid by cooling, in which respect it resembles the Cinchonas. The metallic salts before mentioned, act in the same manner, within a few shades of colour which are not worth taking into consideration, upon the water of maceration, and upon the decoction, of the false ferruginous Angustura. (PLANCHE, p. 7.)

ACTION OF THE *ANGUSTURA PSEUDO-FERRUGINÆA* ON THE ANIMAL ECONOMY.

Experiment 1st. A dog of middle size was made to swallow eight grains of the bark of Augustura Ferruginæa, reduced to a fine powder. At the end of seven minutes, the muscles of the extremities were affected by a convulsive movement; the eyes, which were hagard, shed abundance of tears; the animal walked towards the corners of the laboratory, drawing the feet close to one another; he panted continually; twelve minutes after the ingestion of the poison, the agitation had increased; the head was straightened from time to time in a line with the vertebral column; he bent the posterior legs; the head and trunk were reflected backwards; he made twelve or fourteen steps forwards, and so much at random, that he struck his face against a tub, and fell down immediately upon the side; his eyes were then starting out of his head, and motionless, the conjunctiva was red, all the muscles of the trunk and extremity strongly contracted, the ears bent backwards, the organs of sense insensible to external impressions; the muscles of the face were not agitated by any convulsive movement, and respiration was no longer carried on. This attack lasted five minutes, but the organs of sense preserved their insensibility only during the first minute, for in the middle and towards the end of the paroxysm, the approach of a stick was sufficient to increase the stiffness and all the other symptoms. At the end of this attack, the animal attempted to get up; the mouth was wide open, and the breathing very panting. Ten minutes after, a fresh attack, which lasted four minutes. At last he expired, an hour and a quarter after the introduction of the poisonous substance into the stomach, at the end of the third attack. He was opened twenty minutes after. The heart was no longer beating; the blood contained in its cavities was blackish, partly fluid, partly coagulated; the lungs,

which were distended with blood of the same colour, were somewhat less crepitating than in their natural state; the stomach contained a great quantity of food, for no vomiting had taken place; the digestive canal was sound.

Experiment 2nd. At three quarters past eight, a dog of middle size was made to swallow three grains and a half of the same powder. A quarter of an hour after, he was made to drink a great quantity of water. At six minutes after nine, the animal experienced a trembling in the legs; he was touched, and instantly had an attack of tetanus, which lasted only a minute; he rose up and did not appear ill. At eleven minutes after nine, he was again pushed about; he immediately fell down in a state of remarkable rigidity, which did not cease till the expiration of two minutes; he again made efforts to rise, and ran rapidly about the laboratory; he stopped all at once, pressing strongly his feet against the ground: he had at that moment the trunk excessively arched, and his head touched the ground. At one he had suffered no more attacks, and appeared to be no longer under the influence of the poison. He was made to take six grains of the same powder. Five minutes after, he had an attack which lasted two minutes, and died. In the different paroxysms under which this animal laboured, the tail was sometimes curved upwards, sometimes downwards. He was immediately opened. The blood contained in the ventricles of the heart was black and fluid; the lungs were very little altered; the stomach contained the powder of the Angustura dispersed among some food; there was no lesion in the digestive canal.

Experiment 3rd. A wound made in the inside of the thigh of a great dog, was sprinkled over with nine grains of the same powder. On the third day, the animal not having experienced any thing, thirty-six grains of the same poison were applied to the cellular texture of the other thigh. At the end of seven hours, the animal began to feel the effects of it; he had an attack of tetanus similar to that which we described

in experiment 1st. This attack lasted ten minutes, and he died.

The Dissection took place the next morning. The internal organs presented no alteration; the first wound was red, infiltrated, without any appearance of eschar.

Experiment 4th. A small robust dog was made to swallow two grains and a half of the watery extract of *Angustura Ferruginæa,* which had produced no effect at the end of a quarter of an hour; he was then made to take six grains. A few moments after, the animal experienced a general trembling; he sat down on his hind legs; his body became arched, and he fell down upon the side; his muscles were excessively rigid; there was no agitation of the legs; the pupils were dilated, the organs of sense insensible to external impressions, and the eyelids in a state of great mobility; towards the end of the paroxysm, which lasted two minutes and a half, he recovered the use of his senses; he rose up and walked about the laboratory. Four minutes after, some one sought to frighten him; instantly he fell down again, the head was reflected upon the back, the breathing was suspended. At the end of a minute he opened his mouth and panted considerably. Two minutes after, he had a third attack, during which the organs of sense appeared to be insensible. The end of this paroxysm was marked by profound inspirations and by convulsive movements of the muscles of the face. He died three minutes after. He was opened immediately, the cavities of the heart were no longer contracting, the blood which they contained was black and fluid; the lungs were but little crepitating, and presented an increased degree of density in their texture; the digestive canal was sound.

Experiment 5th. Four grains of the same extract were brought in contact with the cellular texture of a small dog. At the end of ten minutes, the animal experienced general tremblings; his walk became uncertain, his eyes hagard, and three minutes after, he fell into a violent paroxysm. He ex-

perienced four during the three hours that he lived. The body was not opened.

Experiment 6th. Thirty-six grains of the same extract were applied to the cellular texture of the inside of the thigh of a small dog. Five minutes after, trembling of the posterior limbs, and at the end of another minute, a very strong attack, in which the extremities were agitated and stiff; the muscles of the face, of the eyelids, and of the jaws, convulsed; the body was not very much arched, the organs of sense were free, the pupils somewhat dilated, respiration almost suspended. This fit lasted nearly five minutes; the limbs relaxed; the animal made three deep inspirations, and died eleven minutes after the operation. The dissection took place immediately. The heart was no longer beating; the blood was fluid and black in all the cavities of this organ; the lungs, which were somewhat more dense than ordinary, were gorged with blackish blood.

Experiment 7th. Three grains and a half of the watery extract of Angustura, dissolved in half an ounce of water, were injected into the jugular vein of a dog. The animal experienced immediately the symptoms above pointed out, and he expired five minutes after the injection. He was opened at the same instant, and the heart was found distended by a very considerable quantity of blood, which was coagulated.

Experiment 8th. At seven in the morning, a robust dog was made to swallow a grain and a half of the *bitter yellow matter* separated from this species of Angustura. Five minutes after, the animal experienced all the symptoms which characterize the paroxysms of which we have just been speaking, and died at the expiration of fifteen minutes, at the end of the twelfth attack. This bitter matter had been prepared by *M. Planche,* who employed the following process:

"The bark of Ferruginous Angustura was exhausted by several successive macerations in alcohol, at 38°. The liquor, when filtered, was distilled in a glass retort; there were drawn

off, by distillation, the seven-eighths of pure alcohol; the residue, being dried in a water-bath, was treated by boiling distilled water; it is the portion dissolved by this fluid, and concentrated to the consistence of an extract, which constitutes the bitter yellow matter. In order to observe well its colour, it is necessary to extend it in thin layers. This matter is extremely soluble in cold water; it is of an insupportable bitterness; it is possible that it is only a combination of the bitter principle with the yellow matter, for a small quantity of the yellow matter without any sensible bitterness, but only styptic, may be separated (although, indeed, in a very minute quantity) by the means of sulphuric æther. In the surplus, the bitter principle of this extract is found in the most concentrated form possible."

940. The preceding facts permit us to conclude, 1st. That the powder of *Angustura Pseudo-ferruginæa,* and its different preparations, acts like Nux Vomica and the other Strychnos;* 2nd. That the yellow matter appears to be the most active part.

M. Professor *Emmert,* whose medical knowledge is so extensive, has been so good as to communicate to me the results of an important operation performed by him at Bonne, on the bark of a species of Angustura, to which *Rambach* has first given, in 1804, the name of *Angustura Virosa.* This bark appears to be the same as that of which we have just given the history.

* There are many practitioners, who are of opinion that Nux Vomica, Upas, bean of Saint Ignatius, and the false Angustura, act upon the brain as well as upon the spinal marrow. They bring forward in support of their opinion, cases where the administration of Nux Vomica was followed with delirium and the loss of the intellectual faculties. It may be remembered that we have already said that such was the opinion of Wepfer. We have frequently remarked that animals submitted to the action of either of these four substances, lost the use of their senses; but it was only a temporary effect, and always when the paroxysm was extremely violent. Consequently we are of opinion that their principal action takes place upon the vertebral column.

The following are the principal results obtained by *M. Emmert.* 1st. The *Angustura Virosa* is a violent poison for the human species, the mammifera in general, birds, fishes, and reptiles, when it is applied upon the mucous membranes, wounds, the pleura, the peritonæum, and upon all the parts which contain a great quantity of blood-vessels: it is on the contrary, inert, or little active, when brought in contact with the nerves, the tendons, or the epidermis not wounded.

2ndly. The effects of this poison may be put a stop to completely when the circulation in the part to which it has been employed is stopped: the phenomena of poison take place, on the contrary, even when the nerves of the limb on which it had been applied are cut. 3rd. Vinegar, oil of turpentine, and coffee, do not oppose the effects of Angustura; coffee rather accelerates them, oil of turpentine appears to diminish them a little. 4th. After death, the involuntary muscles preserve their irritability, whilst the voluntary muscles no longer shew any sign of it. 5th. A child died after having taken by mistake, the decoction of this bark: he preserved the use of his intellectual faculties, and earnestly begged that he might not be touched, for he experienced terrible cramps after each time of handling him; he had a copious perspiration, but did not vomit." (Lettre de *M. Emmert* du mois de Janvier.)

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